# CONNECTICUT RIVER FLOOD CONTROL

# REPORT

ON

# REVIEW OF SURVEY

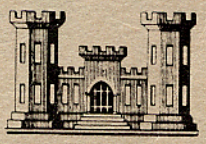
FOR

# FLOOD CONTROL

# PARK RIVER BASIN

## CONNECTICUT

IN TWO VOLUMES
VOLUME II
(APPENDICES)



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

JULY 1966

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# DIGEST OF PUBLIC HEARING

# APPENDIX A

## DIGEST OF PUBLIC HEARING

A public hearing was held in Hartford, Connecticut, on 15 December 1964, to ascertain the views and opinions of local interests on the need and desirability of any modification to the existing flood control project at Hartford, with specific reference to the Park River. The attendance at the hearing numbered 81, of which 43 spoke, including representatives of Federal, State and local governments, industrial establishments, civic organizations, and interested individuals.

With few exceptions, prepared statements were read and submitted as exhibits. A statement prepared by Mr. Charles W. Cooke, Director of the Greater Hartford Flood Commission and presented by Mr. Harold F. Keith, Chairman of the Commission, outlined the desires of the Commission for modification to the existing Park River Conduit. Other speakers presented information substantiating the need for further flood control and generally endorsing the desires of the Commission. No opposition was expressed.

A digest of the public hearing is included in this Appendix. The hearing was conducted by Colonel E. J. Ribbs, Deputy Division Engineer.

DIGEST OF PUBLIC HEARING
HARTFORD, CONNECTICUT
14 December 1964

| Speaker | Interest Represented | Comment |
|---|---|---|
| Abraham Ribicoff, U. S. Senator | State of Connecticut | Stated that review of existing flood control project is certainly necessary. Area has grown tremendously since 1942 and has great potential for growth. Urged Corps of Engineers to carefully study proposals to be presented with a view toward improving the existing flood control project. Urged and will support Corps in seeking authority to reimburse City of Hartford for local expenditures for conduit construction, which will qualify for Federal assistance, once Corps has authority to complete the work. |
| Harold W. Keith, Chairman | Greater Hartford Flood Commission | Statement prepared by Charles W. Cooke, Director of Commission:<br><br>Described existing Park River Conduit, damage survey by the Commission following the August 1955 Flood, present conduit extension work by the Commission, the existing flood problem, and the various solutions which were studied. Presented desired plan of improvement which would consist of: (1) construction of conduit in the gaps left between conduit segments being built by the Commission; (2) 1,000 feet of conduit and 1,200 feet of improved |

| Speaker | Interest Represented | Comment |
|---|---|---|
| Harold W. Keith, Chairman (continued) | Greater Hartford Flood Commission | channel on the North Branch upstream of section proposed for construction by the Commission; (3) a pumping station in the vicinity of Riverside Street to discharge low-level drainage; (4) an auxiliary conduit to supplement the existing conduit and pass flows in excess of 18,000 cubic feet per second. In addition, reimbursement for cost of conduit construction by the Commission was requested. |
| Mayor William E. Glynn | 1. City of Hartford<br>2. Thomas J. Dodd, U. S. Senator | 1. Read a resolution by the Court of Common Council of the City of Hartford passed Dec. 14, 1964 requesting the Corps of Engineers to (a) reimburse the Greater Hartford Flood Commission 14 million dollars expended or to be expended on conduit construction; (b) assume the cost of constructing remaining portion of the Park River Conduit Extension.<br><br>2. Read a statement by U. S. Senator Thomas J. Dodd urging completion of the conduit work and reimbursement of the Greater Hartford Flood Commission's expenditures for conduit construction. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| Alexander A. Goldfarb, Counsel, Greater Hartford Flood Commission | Emilio Q. Daddario, Member of Congress from Conn. | Read prepared statement which covered the history of flooding in Connecticut and the economic importance of Hartford to the Nation and which endorsed the request of the Greater Hartford Flood Commission for flood control improvements in the Park River Basin and reimbursement of money expended. |
| John O'Fallon | Federal Bureau of Public Roads | Had no statement at this time. |
| Col. E. J. Ribbs, Presiding Officer | Dept. of Interior, Fish and Wildlife Service | Read letter from U. S. Fish and Wildlife Service into the record which stated that modification of existing flood control project within the city limits will have no significant effect on limited fish and wildlife resources. |
| William S. Wise, Director, Conn. Water Resources Comm. | John E. Dempsey, Governor of Conn. | Read statement by Governor. In accord with Greater Hartford Flood Commission. Flood control in the Park River Basin is most important to the economic future of the region. Is concerned with Connecticut's industrial development. The potential of the Park River Basin for industrial, commercial, financial and residential development, together with public health and safety, are considerations which recommend review of the existing flood control project to determine need of further improvements. Favors |

| Speaker | Interest Represented | Comment |
|---|---|---|
| William S. Wise, Director, Conn. Water Resources Comm. (continued) | John E. Dempsey, Governor of Conn. | all flood protection that is feasible and practical to protect lives and property. |
| Joseph N. Gill, Commissioner | Conn. Dept. of Agriculture and Natural Resources | Comprehensive flood damage reduction program in Park River Basin will require additional participation by Corps of Engineers. Project formulation for Small Watershed plans for the North and South Branches, Park River, were predicated on provision of an auxiliary conduit as a part of conduit extension. The North Branch Park River Work Plan provides for four flood retarding structures. The South Branch Park River Work Plan, beginning at Hamilton St. in Hartford, provides for four floodwater retarding structures, preservation of a natural flood water retention swamp and over nine miles of stream channel improvement. Work plans were developed recognizing that continued development of flood plain areas results in loss of floodwater storage. Structural works of improvement would need to be augmented by regulatory measures between outlet of structure and proposed conduit extension. Channel encroachment lines are currently being established by the State Water Resources Commission. Upstream flood retarding structures coupled with the implementation of regulatory measures will supplement and complement downstream conduit extension projects. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| Wm. J. Mislock | Commissioner, Conn. Public Works Dept. | Stated that the State is in favor of enclosing the entire Park River. Immediate construction of gap to Broad Street appears to be an immediate necessity so that State can complete its plans for development of parking garage in the area. |
| George S. Koch | Howard S. Ives, Commissioner, Conn. State Highway Dept. | Referred to 1944 Federal legislation establishing interstate Highway concept and 1956 Highway Act establishing highway network and methods of financing and setting 1970 as the completion date for the entire system. Interstate Route 84 through Hartford was designed to take advantage of airspace over the Park River and railroad tracks wherever possible. Preparation of contract plans started in 1959. It became apparent that construction of highway without provisions for future flood control in areas of restricted right of way might preclude necessary flood protection for Hartford. State and Greater Hartford Flood Commission entered into an agreement whereby two facilities could be designed and constructed concurrently where a conflict existed. The cost of conduit work already underway or soon to be put under construction should be considered as a part of the cost of flood control by the Corps of Engineers. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| Lt. Col. Wm. J. St. John, Military Property Office, State of Conn. | Adjutant General, State of Conn. | Endorsed Greater Hartford Flood Commission proposal and recommended early construction of gaps. In addition to flood control, completion of conduit would provide additional parking and eliminate rodent population and hazard of open river. |
| E. Wells Eddy, Vice-Chairman, Greater Hartford Flood Comm. | Self | A resident of Newington, said he appreciates work of Corps and favors its continuation. |
| John W. Jessup, Principal Planner | Planning Commission, City of Hartford | Pointed out that flood control work by Corps in coordination with City has produced great benefits - permitted development of previously unusable land. Immediate construction of three sections of conduit by the Greater Hartford Flood Commission was necessary in order that future benefits could be realized and highway schedule met. If Corps completes work, reimbursement for work already done should be made. Commission supports proposal that Corps assume flood responsibilities to safeguard health, safety and general welfare. |
| Raymond J. Kelly, President, Hartford Board of Education | Board of Education | Supported proposal to have Corps complete conduit which would not only provide flood control but also needed parking and playing field area in the vicinity of Hartford High School. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| George J. Ritter<br>Former Corporation Counsel, City of Hartford | Self | Said 1955 legislation which created Greater Hartford Flood Commission provided that all funds which are spent for flood control would come from bond issues by City of Hartford. It was anticipated at that time that all or part of the funds so spent could at some future date be returned by the Federal Government. |
| Elisha Freeman,<br>City Manager | City of Hartford | Introduced 9 Department heads who commented as follows: |
| John Walsh,<br>Director of Finance | City of Hartford | Greater Hartford Flood Commission authorized to spend $20 million. $14 million spent or committed for conduit essential for construction of Highway I-84. $6 million spent or committed on other flood control work. $14 million is 29% of City's indebtedness. Requests Corps to complete the conduit work. |
| L. C. Lovell,<br>Director of Public Works | City of Hartford | The 1955 flood divided city into two parts. Conduit will eliminate 8 bridges, with replacement cost of $3,200,000, most of which are in need of replacement. Saving in replacement could be considered a benefit. |
| Robert J. Bliss,<br>Exec. Director,<br>Hartford Redevelopment Agency | City of Hartford | Agency in favor of any proposal particularly in vicinity of 33 acre city urban renewal project between Capitol Avenue and Park Street which will cost Federal, State and City governments a total of $2,000,000. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| Robert J. Bliss, Exec. Director, Hartford Redevelopment Agency (continued) | City of Hartford | Much of area, adjacent to the Park River, will have its use limited to parking unless flood protection is provided. Conduit plus renewal will change a flood prone area to a modern industrial park. |
| Charles E. Hughes, Traffic Engineer | City of Hartford | In 1955, all east-west roads to and from Hartford were blocked by overflowing North and South Branches Park River. A repetition today would be a catastrophe. When completed, interstate highway I-84 will supplement the local streets but it is essential that they never be again flooded. |
| Everett J. Pyle, Director of Parks and Recreation | City of Hartford | Enclosing the Park River in a conduit would make more park land available for development. Area would be used by factory workers and nearby residents. Addition of open space land would be consistent with Federal, State and local open space programs. |
| Dr. Norton C. Chaucer, Director of Health | City of Hartford | Proposed conduit extension will aid in pollution abatement, reduce odor nuisances, aid in rodent control, eliminate hazard to children, and eliminate the use of river bed and banks for illegal waste and rubbish disposal. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| Daniel G. Lyons, Exec. Director, Hartford Housing Authority | City of Hartford | The 1955 flood necessitated evacuation of 178 families. Conduit construction would prevent a repetition and would eliminate hazard to children. |
| George E. Heppner, Asst. City Engineer | Porter H. Barrows, Hartford City Engr. | Supports proposal of Hartford Flood Commission. During 1955 flood all bridges in Hartford and for some distance up the North and South Branches Park River were inundated. Major fire apparatus and police control was limited to center of Hartford. Major hospitals were isolated to all but those in downtown area. A reduction in the possibility of future flooding is essential to prevent a recurrence. |
| Robert M. Kelley, Asst. Supt. of Schools | Hartford School Dept. | New high school is hampered by lack of space for athletics and for parking, both day and evening. Extension of the conduit would provide added space needed for full utilization of school facilities. |
| Betty Knox, Councilwoman | Hartford City Council | Expressed desire for adequate flood control financed on a fair share basis with help from Federal Government. |
| Ann Uccello, Councilwoman | Hartford City Council | Pointed out that Hartford is only community to undertake its own program. A program of this scope and magnitude deserves financial assistance. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| Theodore J. DeLorenzo, Councilman | Hartford City Council | Said Hartford is burdened by bonded indebtedness and because central area is on a diminished tax basis. 50% of area is non-taxable governmental and charitable properties, hospitals and schools. Corps should encourage community initiative such as Hartford's by assuming responsibility for conduit completion. |
| Thomas J. Corrigan, Councilman | Hartford City Council | Importance of flood control to Hartford is indicated by the fact that 29% of city's bond indebtedness is tied up in it, as a result, other programs have had to be put off; he stated City should not be penalized for its initiative. |
| Christopher Percy | Capitol Region Planning Agency | He believes extensive flood control projects completed to date make sound beginning of an overall flood control program. CRPA questions the need for enclosing the North Branch Park River in a conduit above Farmington Avenue. Every effort should be made to keep the river system as a permanent open space with necessary flood control achieved by flood plain zoning. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| George B. Kinsella, Councilman | Hartford City Council | Corps participated in flood control after 1936 flood on Connecticut River. A problem now exists along the Park River. Stated that we ask now for assistance before flood conditions again occur. |
| Arthur W. Sweeton, Deputy Manager and Chief Engineer, Bureau of Public Works, Metropolitan District | Chairman McDonough | Urged further flood control in Greater Hartford. Auxiliary conduit along Park Street should provide an economical outlet for some of the storm drains to be built as part of the District's comprehensive plan to separate old combined sewers. Use of auxiliary conduit for this purpose should result in savings of many hundred thousands of dollars. |
| Robert K. Killian, Attorney, Chairman, Hartford Democratic Town Committee | Democractic Town Committee, Individual | Felt that if favorable recommendation reflecting unanimous support of those present is submitted to Washington, funds will be made available. |
| James E. Bent, President, Greater Hartford Chamber of Commerce | (1) Individual<br>(2) Greater Hartford Chamber of Commerce | (1) Said he was President, in 1955, of Rotary Club of Hartford which joined with others to form United Service Clubs of Conn. to raise money for flood relief work. Claims, otherwise unreported, amounted to $40 million. Taxes alone on a loss of this size would probably be enough to pay for project being considered now. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| James E. Bent, President, Greater Hartford Chamber of Commerce (continued) | (2) Greater Hartford Chamber of Commerce | (2) Chamber of Commerce believes that flood control on Park River is important to the economic future of the area. City's initiative in attempting to solve flood problem warrants assistance of Corps of Engineers. |
| John H. Fairbrother | Royal McBee Corp. | Stated that existing flood control project at Hartford is usually taken for granted. Company is vitally interested in Kane Brook. During flood, water covered parking area and threatened plant. East-West highway construction has aggravated the conditions as large areas have been filled, eliminating natural storage. Requested attention be given this problem to prevent future damages. |
| Robert K. Mooney, Treasurer, Mooney Co. | Mooney Co. | Company is in the storage business and owns property on Capitol Avenue abutting the Park River. Buildings were wet in 1936 and 1955. Clients do not like flood-prone buildings for storage of machinery and stock. |
| Wm. M. Baker, President, Merrow Machine Co. | Merrow Machine Co. | Gave data: plant on Laurel and Riverside Streets at confluence of north and south branches of Park River, three feet of water over floor in 1955. Heavy equipment cannot be moved. Some flood produced damages do not become apparent until months after the floods. Employ 250-275 people. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| William R. Peele | Arrow-Hart & Hegeman Electric Co. | Said that they employ approximately 2,000 in 5 Hartford plants with 900,000 sq. ft. of space. Have already had land and one building taken by Hartford Flood Commission between Broad and Flower Streets. Hopes Corps will assist in completing the project. |
| Herbert E. Johnson, Vice-President, Hartford Gas Co. | Chairman, Wm. T. Webb | Stated that existing flood control project made it possible for the Company to construct a steam and chilled water plant adjacent to the Park River. Prior to flood control, gas service was interrupted and property damaged. Further flood control as proposed by Mr. Cooke would provide added protection and increase Hartford's tax base. |
| George A. Washburn, Civil Engineer | Hartford Electric Light Co. | Adequate flood control is vital to future commercial and industrial development and public health and safety. Urged conduit completion. |
| Wm. H. Kuehnel, Secretary, Greater Hartford Labor Council, AFL-CIO | AFL-CIO | Interested in flood control as thousands of members have suffered from past floods. Without flood control, manufacturing plants might move and jobs be lost. Endorsed proposal by Greater Hartford Flood Commission. |

| Speaker | Interest Represented | Comment |
|---|---|---|
| T. R. Harlow, Director, Conn. Historical Society | Conn. Historical Society | Reported Society is privately endowed institution with 900 members in Connecticut; 600 in other states. 70,000 books and pamphlets, and thousands of museum pieces, valued at $10 million. 1955 flood damaged and destroyed rare books. Repairs to building and cost of dike for protection was $42,000. In favor of flood control. Endorse proposal of Flood Commission. |
| Henry R. Olsen | Kilian Steel Ball Corp. | Reported that two 1955 floods caused flooding in plant. First - 8 feet of water; second - 4 feet. In favor of Commission's proposal. |
| Alexander Goldfarb, Counsel for Greater Hartford Flood Commission | Greater Hartford Flood Comm. | Stated $20 million statutory authority for flood control exhausted or committed. No further authority likely except from the Federal Government. |
| Theodore Brindamour, Engineer | Greater Hartford Flood Commission | Said that Park River above existing conduit is subject to flood damage not only from runoff from the Park River Basin but from backup through the conduit when the Connecticut River is at a high stage. |

# APPENDIX B

# HYDROLOGY AND HYDRAULICS

APPENDIX B

HYDROLOGY AND HYDRAULICS

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# APPENDIX B

## HYDROLOGY AND HYDRAULICS

### 1. INTRODUCTION

This appendix presents hydrological and climatological data for the Park River basin, derivation of the standard project flood, an analysis of the effect of various changes that have recently taken place in the basin, and effect of proposed plan of protection.

### 2. BASIN DESCRIPTION

a. General. The Park River basin, shown on plate B-1, is located in the central part of Connecticut where it drains a large portion of the metropolitan Hartford area. The watershed which drains 78.3 square miles is roughly rectangular in shape with an average width in an east-west direction of 5 miles and an average length in a north-south direction of 16 miles. Elevations range from about 20 feet msl along the lower reaches of the river to a maximum of about 900 feet along the western edge of the watershed. Most of the area, however, is below 200 feet msl in elevation and is comprised of rolling to hilly topography.

b. Park River. The Park River, located entirely within the confines of the city of Hartford, is formed by the junction of the North and South Branches. It flows in an easterly direction for a distance of 2.2 miles and discharges into the Connecticut River about a half mile upstream of the Charter Oak bridge. In 1944 the Corps of Engineers completed a twin-barreled concrete conduit that enclosed the Park River from Bushnell Park through the business center of Hartford to the Connecticut River (see plate B-2 for the general plan and profile).

c. South Branch Park River. The South Branch which flows in a generally northerly direction, drains an area of 46.8 square miles south and west of Hartford and is formed at the confluence of Trout and Piper Brooks. Trout Brook, with an area of 19.6 square miles, originates in the Talcott Mountain range in West Hartford and Farmington. Piper Brook, with a watershed of 22.2 square miles, develops in the hilly areas of New Britain. Its two main tributaries are Mill and Bass Brooks with respective areas of 5.6 and 10.3 square miles. There are numerous lakes and swampy areas in the tributary headwaters which have a

considerable reducing effect on floodflows. The Soil Conservation Service is constructing four floodwater retarding structures in the basin that control a total drainage area of about 5.2 square miles. These structures will have some modifying effect on future floods.

d. North Branch Park River. The North Branch which flows in a generally southerly direction drains an area of 27.4 square miles west and north of Hartford and is formed at the junction of Wash and Tumbledown Brooks. Wash Brook with 5.7 square miles drains the northern part of the basin and originates in the town of Bloomfield. Tumbledown Brook drains the western part of the basin and has an area about 8.7 square miles. Beamans Brook which also originates in Bloomfield has a watershed about 5.2 square miles.

There is one lake and several swampy areas in the basin but they do not have as much effect on floodflows in the North Branch. The Soil Conservation Service is constructing floodwater retarding structures in the basin that control about 8.1 square miles. These reservoirs have an appreciable reducing effect on floodflows.

3. CLIMATOLOGY

a. General. The Park River watershed has a variable climate characterized by frequent but usually short periods of precipitation. The basin lies in the path of the "prevailing westerlies" and is exposed to the cyclonic disturbances that cross the country from the west and south-west toward the northeast quadrant of the country. The area is also exposed to coastal storms, some of tropical origin, that travel up the Atlantic seaboard. In late summer and autumn months these storms occasionally attain hurricane intensity. Thunderstorms, either of a local origin or associated with a frontal system, occur generally during the summer months.

b. Temperature. Average monthly temperatures in the Park River basin vary considerably through the year with a mean annual temperature of about 50° F. The summer temperatures average in the upper 60's and low 70's with winter temperatures averaging in the upper 20's and low 30's. Freezing temperatures can be expected from about the middle of November until the end of March. The mean, maximum and minimum monthly temperatures for 60 years of record at the Hartford Weather Bureau station, located about 10 miles north of downtown Hartford are shown in table B-1.

c. Precipitation. The average annual precipitation over the Park River watershed is approximately 43 inches, which is evenly distributed throughout the year. The maximum and minimum annual precipitation at the Hartford Weather Bureau station (elevation 170

feet msl) for 60 years of record are 62.94 and 32.26 inches, respectively. Table B-2 summarizes the precipitation records for this station.

TABLE B-1

MONTHLY TEMPERATURES
(Degrees Fahrenheit)

| Month | Mean | Maximum | Minimum |
|---|---|---|---|
| January | 27.5 | 66 | -26 |
| February | 27.8 | 68 | -21 |
| March | 37.0 | 87 | - 8 |
| April | 47.9 | 94 | 15 |
| May | 58.9 | 95 | 27 |
| June | 67.7 | 101 | 37 |
| July | 73.0 | 101 | 44 |
| August | 70.6 | 101 | 42 |
| September | 63.6 | 101 | 27 |
| October | 53.4 | 91 | 22 |
| November | 42.1 | 83 | 10 |
| December | 30.5 | 67 | -11 |
| ANNUAL | 50.0 | 101 | -26 |

TABLE B-2

MONTHLY PRECIPITATION
(Inches)

| Month | Mean | Maximum | Minimum |
|---|---|---|---|
| January | 3.61 | 7.77 | 0.91 |
| February | 3.21 | 5.72 | 1.54 |
| March | 3.69 | 9.21 | 0.29 |
| April | 3.68 | 7.66 | 0.65 |
| May | 3.43 | 7.04 | 0.73 |
| June | 3.46 | 8.08 | 0.66 |
| July | 3.67 | 11.24 | 0.54 |
| August | 3.98 | 21.87 | 0.93 |
| September | 3.52 | 14.59 | 0.20 |
| October | 3.03 | 11.61 | 0.18 |
| November | 3.71 | 7.36 | 0.87 |
| December | 3.55 | 6.88 | 0.78 |
| ANNUAL | 42.54 | 62.94 | 32.26 |

d. Snow. The average yearly snowfall over the watershed is about 40 inches. The water content of the snow cover over the entire basin reaches a maximum in the late winter or early spring with an average depth of 2 to 3 inches. Table B-3 summarizes the monthly and annual average snowfall at the Hartford Weather Bureau for 59 years of record.

e. Storm types. The Park River watershed experiences storms of four general types, namely:

(1) Extratropical continental storms which move across the basin under the influence of the "prevailing westerlies."

(2) Extratropical maritime storms which move northward along the eastern coast of the United States.

TABLE B-3

MONTHLY SNOWFALL
(Depth in Inches)

| Month | Snowfall |
|---|---|
| January | 10.9 |
| February | 12.1 |
| March | 7.5 |
| April | 1.4 |
| May | - |
| June | - |
| July | - |
| August | - |
| September | - |
| October | - |
| November | 1.9 |
| December | 8.1 |
| ANNUAL | 41.9 |

(3) Coastal storms of tropical origin, some of which attain hurricane magnitude. Hurricane storms generally occur in late summer or fall months and have caused the most devastating floods in the basin.

(4) Thunderstorms produced by local convective activity or by more general frontal action.

f. Notable storms. The storms associated with the 5 major floods of record in the basin are briefly described as follows:

(1) March 1936. A succession of several continental disturbances of the cold frontal type moved across the northeastern part of the United States during the early part of March. The disturbances were accompanied by warm temperatures and heavy rains. The severest storm produced 3 inches of rain in a 24-hour period.

(2) January 1938. On 24-25 January, another continental frontal type storm system passed over the basin depositing about 3 inches of rainfall. Warm temperatures in the 50's during this period

produced considerable runoff from snowmelt.

(3) September 1938. A stationary cold front associated with unsettled weather along the Atlantic coast was overrun by a rapidly moving tropical hurricane producing record breaking rainfall over large areas of Connecticut. Between 17 and 21 September, light rain fell almost continuously and culminated in a heavy downpour. During this 4-day period, between 11 and 12 inches of precipitation fell over the basin.

(4) August 1955. The northwesterly progress of hurricane "Diane" through the Middle Atlantic States was blocked by a stagnant high pressure system over the northeastern United States forcing the storm to veer off in an easterly direction, south of Long Island, on a course parallel to the southern New England coast. As the system moved slowly out to sea south of New England, it became recharged with moisture which was literally dumped over southern New England. This storm deposited 12 to 13 inches of rain over the basin.

(5) October 1955. The storm of 14-17 October originated as as extratropical low pressure area off the Florida coast. The forward northward movement of the system stalled off the New Jersey coast. Warm moist air circulating about the low overran the cooler air of the blocking high over southern New England producing heavy rainfall from 6 to 7 inches over the basin.

4. STREAMFLOW DATA

The U. S. Geological Survey has published records of streamflow for three locations since 1936 and four others since 1958 in the Park River watershed. A summary of pertinent data at each gaging station is given in table B-4.

5. HISTORY OF FLOODS

a. General. Outstanding floods on the Park River have occurred during all seasons of the year. Heavy rains with melting snow resulted in the floods of March 1936 and January 1938. Heavy rains during the summer and fall months caused the major floods of September 1938, August and October 1955. In addition, local thunderstorms have caused flash flooding on the smaller streams.

b. Historic floods. Records of historic floods occurring on the Park River are meager. However, the flood of October 1869, resulting from 12 inches of rain falling in 2 to 3 days, was severe and caused considerable damage.

c. Floods of record. The Park River has experienced five major

TABLE B-4

STREAMFLOW RECORD - PARK RIVER BASIN

| Location | Drainage Area (sq.mi.) | Period of Record | Discharge (cfs) Mean | Maximum | Minimum |
|---|---|---|---|---|---|
| Park River at Hartford, Connecticut | 74.0 | Oct 1936 - Sept 1961 | 124 | 14,000(1) | 11 (2) |
| South Branch at Hartford, Connecticut | 40.6 | Oct 1936 - | 73.1 | 5,000(1) | 7 (2) |
| North Branch at Hartford, Connecticut | 25.3 | Oct 1936 - | 38.1 | 10,000(1) | 0.4(2) |
| Trout Brook at West Hartford, Connecticut | 14.7 | May 1958 - | 28.3 | 1,020 | 1.4(2) |
| Piper Brook at Newington, Connecticut | 14.4 | May 1958 - | 24.3 | 935 | -1 |
| Wash Brook at Bloomfield, Connecticut | 5.66 | Apr 1958 - | 8.01 | 465 | -1 |
| Mill Brook at Newington, Connecticut | 2.56 | Apr 1958 - | 4.23 | 460 | -1 |

(1) August 1955
(2) Minimum Daily Flows

floods since 1900. They occurred in March 1936, January and September 1938, and August and October 1955. The flood of August 1955 is by far the largest flood of record in the basin. According to USGS records, the peak discharge at the Park River gaging station was 14,000 cfs or about 190 csm. Total volume of runoff approximated 8.5 inches. The October 1955 flood was the second largest and the volume of runoff was about 4.5 inches. Comparative flood magnitudes for these 5 floods at 3 USGS gaging stations in the basin are given in table B-5.

TABLE B-5

FLOODS OF RECORD*
(Peak Flow in CFS)

| Date | Park River Gage (DA=74.0 sq.mi.) | South Branch Gage (DA=40.6 sq.mi.) | North Branch Gage (DA=25.3 sq.mi.) |
|---|---|---|---|
| 19 Aug 1955 | 14,000 | 5,000 | 10,000 |
| 16 Oct 1955 | 6,420 | 2,800 | 3,680 |
| 25 Jan 1938 | 5,650 | 2,860 | 3,000 |
| 12 Mar 1936 | 5,400 | - | 2,800 |
| 21 Sept 1938 | 5,320 | 3,600 | 1,350 |

* USGS published records

d. Park River discharge frequency relationship. Peak discharge frequency relationships were developed at the Riverside Street gaging station from published records of the U. S. Geological Survey and stage records maintained since 1912 by the Engineering Department of Hartford. The frequency analysis was made in accordance with procedures described in ER 1110-2-1450, "Hydrologic Frequency Estimates," dated 10 October 1962. The method assumes that logarithmic values of annual peak flows are normally distributed, thereby permitting the application of standard statistical procedures. This enables the discharge frequency curve to be defined by its mean value and standard deviation. A skew factor of 1.0 was adopted and was based on a regional frequency analysis for the Connecticut River basin. A natural (1955 conditions) discharge frequency curve was developed based on the available records and is shown on plate B-3.

6. ANALYSIS OF FLOODS

a. General. Past floods were analyzed to determine the hydrologic flood characteristics of the Park River watershed. Both tributaries

were divided into subtributary areas and routing reaches for hydraulic analysis. The limits of the reaches were taken at hydraulic control points such as gaging stations, reservoir locations, and mouths of tributaries. Floods analyzed included those of March 1936, November 1937, January and September 1938, and August and October 1955. The winter and spring floods contained considerable snow melt which affected rainfall runoff relationships.

On the South Branch, floodflows were greatly modified by both the water supply reservoirs in the headwaters and the extensive valley storage throughout the watershed especially along the lower reaches. In addition considerable amounts of floodflows were diverted over low natural divides into other watersheds.

Floodflows on the North Branch were also affected by extensive valley storage in the tributary headwaters and also along the main stem upstream of the Albany Street gaging station.

b. Recent local flood control measures. Since the record floods of 1955, local interests developed plans for flood control works of improvements in both branches of the Park River which have been constructed or in the final design stages. The improvements which have substantially affected the runoff characteristics of the watershed, some beneficially and others adversely, are as follows:

(1) Construction of 8 flood retarding structures by SCS.

(2) About 9 miles of improvements along the South Branch consisting of the realignment, widening and deepening of the existing channel. The improved channels will have discharge capacities ranging from 11,000 cfs near the mouth of the South Branch to 6,000 cfs on Trout Brook and 4,500 cfs on Piper Brook. Some sections of the completed and proposed channels are concrete lined.

(3) Major highway construction in the flood plain of the South Branch.

(4) Extension of the existing Park River conduit up the North Branch to near Farmington Avenue and up the South Branch to Pope Park.

Table B-6 presents pertinent data on the 8 reservoirs and the South Branch channel improvements. General locations of the improvements are shown on plate B-1.

c. Effect of local works on flood discharges. Flood retarding structures, constructed and proposed by the Soil Conservation Service store runoff from 8.11 square miles, or 29 percent of the North Branch and 5.21 square miles, or 11 percent of the South Branch watershed.

TABLE B-6

PERTINENT DATA

A. SOIL CONSERVATION FLOOD RETARDING STRUCTURES*

| Reservoir | Drainage Area (sq.mi.) | Storage Acre-Feet | Storage Inches of Runoff | Outlet Discharge with Pool at Spillway Crest CFS | Outlet Discharge with Pool at Spillway Crest CSM | Conduit Size |
|---|---|---|---|---|---|---|
| North Branch | | | | | | |
| Wintonbury | 1.42 | 725 | 8.57 | 95 | 67 | 30" Dia. |
| Blue Hills | 1.70 | 1,057 | 11.66 | 66 | 39 | 30" Dia. |
| Bloomfield | 3.05 | 1,588 | 9.76 | 165 | 54 | 36" Dia. |
| Cold Spring | 1.94 | 1,038 | 10.03 | 107 | 55 | 36" Dia. |
| | 8.11 | | | | | |
| South Branch | | | | | | |
| Talcott | 1.57 | 890 | 10.63 | 114 | 73 | 2-30" Dia. |
| Bugbee | 1.96 | 760 | 7.27 | 280 | 143 | 48" Dia. |
| South Reservoir | 1.30 | 650 | 9.40 | 114 | 88 | 30" Dia. |
| Burnt Hill | 0.38 | 170 | 8.39 | 53 | 140 | 30" Dia. |
| | 5.21 | | | | | |

* All reservoirs have been completed except Cold Spring, Burnt Hill and Bugbee which are scheduled for completion in 1966 or early 1967.

B. SOUTH BRANCH CHANNEL IMPROVEMENTS BY SCS AND LOCAL INTERESTS

| Stream | Location | Channel Capacity (cfs) | Scheduled Completion Date |
|---|---|---|---|
| South Branch | Hartford W. Hartford | 10,400 to 11,100 | 1968 |
| Piper Brook | W. Hartford Newington | 3,600 to 4,550 | 1966 |
| Mill Brook | Newington | 1,000 | 1967 |
| Trout Brook | W. Hartford | 3,300 to 6,000 | 1968 |
| Rockledge Brook (S. Branch Trout Brook) | W. Hartford | 750 to 1,000 | Completed |

These reservoirs will have some modifying effect on future floods in the basin. Because of the large outlet capacities of the reservoirs, there is only a small modifying effect on minor to moderate size floods. More appreciable reduction will be realized during major floods. Other works such as channel improvements, highways and conduit extensions will have a tendency of increasing peak flows because of the loss of valley storage, lowering of the gradient and improved channel alignment. On the South Branch the net overall effect of improvements will be higher peak flows but occurring at corresponding lower elevations. The effect of the improvements on the North Branch will be lower peak flows and lower elevations. Channel work on the South Branch with lower gradients and less effective use of the valley storage, will cause higher peak flows to occur on the Park River which will result in more frequent flooding. On the Park River the conduit extensions constructed for highway crossings will have no modifying effect on discharge relationships at the open river sections. A discharge-frequency curve for the Park River depicting the effects of local works is shown on Plate B-3. The higher peak flows also will reduce the degree of protection provided lower Hartford by the existing Park River conduit. It is conceivable that, with the numerous changes that have taken place since 1955, a storm of the magnitude of hurricane "Diane" could now cause a flood that would overtax the capacity of the existing Corps of Engineers conduit and flood the protected portion of the city of Hartford.

d. Effect of local works on the August 1955 flood. The August 1955 storm produced greater rainfall amounts over the North Branch than the South Branch. Over the North Branch the average precipitation was about 12.5 inches, while the South Branch experienced an average of about 10.5 inches. An ishohyetal map of the storm is shown on plate B-5. Although the North Branch drains 25.3 square miles compared to the 42 square miles of the South Branch, the estimated peak of 10,000 cfs (U. S. Geological Survey) on the North Branch was twice as great as the estimated peak of 5,000 cfs (USGS) on the South Branch. Several factors tended to produce this smaller peak flow on the South Branch. The four headwater water supply reservoirs controlling 4.1 square miles were drawn down at the beginning of the flood and therefore stored a considerable amount of runoff. It is estimated that approximately 2,000 acre-feet of floodflows were diverted into the Mattabesset and Quinnipiac River basins from the Piper and Mill Brook watersheds. These diversions took place at low natural divides and were caused by high backwater gradients in the brooks and the South Branch. The floodflow on the South Branch also was affected by about 3,600 acre-feet of valley storage.

The North and South Branches component flows for the 1955 flood were routed to the Park River and a synthesized hydrograph

was added for the local drainage area of 7.2 square miles. The total compared favorably with the USGS Park River hydrograph except for volume. Analysis of the North Branch hydrograph indicated that the runoff exceeded the average rainfall. The runoff hydrograph was adjusted and rerouted to the Park River. Plate B-4 shows the August 1955 flood hydrographs at the USGS gaging stations and the adopted North and South Branch components routed to Riverside Street on the Park River. Had there been no diversion of floodflows out of the basin, it is estimated the peak flow of the South Branch at Newfield Avenue would have increased from 5,000 to 7,200 cfs resulting in a peak of 15,700 cfs on the Park River at Riverside Street. Current channel and highway works would further increase the Newfield Avenue peak to about 9,000 cfs. The four SCS flood retarding reservoirs would reduce the peak flow to about 8,200 cfs which is still considerably higher than the estimated 5,000 cfs experienced in 1955.

On the North Branch, channel improvements and highway work would have only a minor effect on a recurring August 1955 flood. The four SCS flood retarding structures would reduce the peak flow of 10,000 cfs at Albany Avenue to about 7,500 cfs. At the USGS gaging station on the Park River, the effect of highway and channel works would increase the peak flow of 15,700 cfs (with no diversion) to 18,750 cfs and the SCS reservoirs would reduce the peak to 16,100 cfs. The net overall effect of all these improvements would be to increase the peak of the August 1955 flood by about 400 cfs as shown on plate B-4.

e. Effect of local works on Park River elevations in Hartford.

(1) General. Two open lengths in the Park River conduit extension still remain, the first being section 2 in the Flower Street-Broad Street area and the other being sections 4 and 7 upstream of Capitol Avenue to about Willow Street (see plate B-2). Channel conditions in these open gaps have remained the same, that is, the cross sectional areas, alignment and riverbed profiles have not been changed. As previously mentioned, the effect of the overall local works has been to increase the Park River discharges for all frequencies. The resultant effect has been an increase in water surface elevations for all frequencies along the Park River upstream of the conduit entrances near the State Armory.

(2) Overtopping of Bushnell Park dike. The original conduit, completed in 1944, has a headwall and dike at the conduit entrance near Bushnell Park constructed to elevation 51 feet msl (including 3 feet of freeboard). This gave added protection to the downtown area of Hartford from all but rare floods when the dike might either be overtopped or fail, resulting in large volumes of water flowing into downtown Hartford. Although it takes a large flood to overtop this dike, the frequency of such an occurrence has been appreciably

increased due to local work improvements. The original conduit and headwall dike were designed for a discharge of 18,000 cfs. With a greater design storm than previously used and recent developments in the basin, the standard project flood would produce a flow of 30,300 cfs at Riverside Street. This would result in overtopping the entrance headwall and cause serious flooding in downtown Hartford.

7. STANDARD PROJECT FLOOD

a. General. In 1940 the engineering firm of Metcalf & Eddy recommended a design discharge of 18,000 cfs for the Park River conduit that extends from the Connecticut River to Bushnell Park. Following the flood of August 1955 Metcalf & Eddy were retained by the Greater Hartford Flood Commission to evaluate the effect of this record flood on design floodflows in the Park River basin. Using additional rainfall and runoff data, the engineering firm computed a new design flood which had a peak discharge of 24,900 cfs. A report prepared by Metcalf & Eddy for the Commission, dated February 1958, outlined the procedures used in developing the flood. In general, the procedures were in accordance with those outlined in EM 1110-2-1405 and CEB 52-8. The storm producing this flood has been adopted as the standard project storm for the Park River. Recently local interests proposed a work plan which would significantly change the runoff characteristics of the basin. NED retained Metcalf & Eddy to evaluate the effects of these proposed improvements in the basin on the design storm. Results of this study indicated that the SPF would increase from 24,900 to 30,300 cfs.

b. Standard project storm rainfall. The adopted standard project storm rainfall was based upon depth-duration curves of the experienced August 1955 "Diane" rainfall which was centered over the nearby Westfield River basin in Massachusetts. Approximately 18.3 inches of rain fell over 75 square miles in a 48-hour period and 12.5 inches in a 12-hour period. The maximum 6-hour value was 7.9 inches. These amounts are comparable with values from CEB 52-8 for the 6 and 12-hour periods but are considerably higher for the 48-hour duration. A comparison of the adopted SPS rainfall and values from CEB 52-8 and the experienced August 1955 rainfall at Hartford are shown on plate B-6. Since the main branches of the Park River contain a considerable amount of valley storage, the amount of rainfall is an important factor. Hence, the larger volume storm was adopted as the SPS. A tabulation of 6-hour rainfall values from this storm is given in table B-7.

TABLE B-7

ADOPTED STANDARD PROJECT STORM RAINFALL
PARK RIVER BASIN

| Time | 6-Hour Rainfall (inches) | Losses (inches) | Rainfall Excess (inches) | Rainfall Pattern (inches) |
|---|---|---|---|---|
| 0 | - | - | - | - |
| 6 | 7.9 | 0.3 | 7.6 | - |
| 12 | 4.6 | 0.3 | 4.3 | 0.5 |
| 18 | 1.8 | 0.3 | 1.5 | 1.5 |
| 24 | 1.8 | 0.3 | 1.5 | 4.3 |
| 30 | 0.8 | 0.3 | 0.5 | 7.6 |
| 36 | 0.8 | 0.3 | 0.5 | 1.5 |
| 42 | 0.3 | 0.3 | - | 0.5 |
| 48 | 0.3 | 0.3 | - | - |
| TOTAL | 18.3 | 2.4 | 15.9 | 15.9 |

c. Unit hydrographs. Unit hydrographs were derived from analyzing floods recorded at the gaging stations on the North Branch Park River and the Park River. A comparison of the unit hydrographs derived by NED and Metcalf & Eddy are shown on plate B-7. The close agreement in unit hydrographs led to the adoption of the Metcalf & Eddy unit graphs for determining the standard project flood. Because of the large amount of valley storage on the South Branch Park River, the recorded flood hydrographs did not lend themselves to unit hydrograph analysis.

d. Standard project flood. The adopted standard project flood at the Park River gage was derived by applying the selected storm rainfall excess shown in table B-7 to the adopted 6-hour unit hydrograph. At the Park River gage the peak discharge from this flood was 24,900 cfs and referred to by Metcalf & Eddy in their reports as the flood from project storm A. This flood was based on runoff conditions as they existed immediately following the August 1955 flood.

e. Effect of local improvement on standard project flood. The consulting firm of Metcalf & Eddy were retained by NED to evaluate the effect of the present improvements as well as possible future improvements on the adopted standard project storm (see paragraph 6b). Assuming 1955 river conditions but no diversions out of the watershed, subtributary components were developed and routed to the Park River gaging station. The component routings resulted in a peak flow of 25,800 cfs which is only 4 percent greater than the

peak flow of 24,900 cfs obtained by applying storm rainfall to the unit hydrograph at the Park River gage. Plate B-8 shows the standard project flood based on 1955 conditions and also as modified by local improvements. The result of Metcalf & Eddy's investigations are contained in report titled: "Hydrological Investigations and Report on Design Flood, Park River Basin, Connecticut," dated October 1963. Table B-8 gives a summary of results of peak discharges for various improved conditions. The SPF peak of 25,800 cfs would be increased to about 35,000 cfs due to recent channel improvements and highway construction. This peak would be reduced to 30,300 cfs by the eight flood retarding structures in the basin. The net effect of all local improvements since 1955 would be an increase of 4,500 cfs on the peak of the SPF.

The SPF was routed through the valley storage on the North and South Branches assuming a maximum conduit capacity of 18,000 cfs. At Bushnell Park, the headwall of the conduit would be overtopped resulting in the release of about 10,000 acre-feet of water into the downtown section of Hartford. Assuming that floodflows in excess of 18,000 cfs would be contained upstream of the conduit entrance then ponding would occur to about elevation 59 feet msl.

8. SELECTED PLAN OF IMPROVEMENTS

a. General. After careful consideration of the various methods of providing flood protection for the city of Hartford, it was determined to provide local protective works consisting of Park River conduit extensions, a 22-foot diameter auxiliary conduit and pumping station. The protective works are designed to provide protection for the standard project flood. In formulating the plan, it was necessary to consider the following:

(1) Concurrent elevation of Connecticut River and peak outflow from Park River.

(2) Effect of open sections in conduit extension.

(3) Maximum permissible ponding upstream of the existing conduit entrances.

b. Concurrent Connecticut River elevation. Since the improvements on the Park River will consist mainly of completing conduit extensions and constructing an auxiliary conduit, the coincident tailwater elevation is of prime importance in determining the size of an auxiliary conduit. Studies were made of past major floods on

TABLE B-8

SUMMARY OF RESULTS OF PEAK DISCHARGES
FROM ADOPTED SPF

| Location | Drainage Area (sq.mi.) | 1955 Conditions (cfs*) | Modified by "A" (cfs*) | Modified by "B" (cfs*) | Modified by "C" (cfs*) | Modified by "D" (cfs*) |
|---|---|---|---|---|---|---|
| North Branch Park River at Mouth | 27.7 | 11,450 | 6,120 | 7,960 | 10,400 | 10,400 |
| South Branch Park River at Mouth | 47.0 | 14,750 | 14,100 | 14,900 | 20,400 | 23,300 |
| Park River at Riverside Street Gage | 74.7 | 25,800 | 19,900 | 22,000 | 30,300 | 33,500 |



* Free unimpeded flows with conduits large enough to discharge these flows

"A" - 8 SCS flood retention reservoirs

"B" - 8 SCS flood retention reservoirs and extension of conduit to the entrances on both branches

"C" - Reservoirs, conduit extensions, South Branch watershed channel improvements

"D" - Reservoirs, conduit extensions, channel improvements and ultimate South Branch conduit to confluence of Piper and Trout Brooks

the Connecticut River and the relative timing of Park River flows. Although local improvements have tended to speed up peak inflows on the North and South Branches, the large volume associated with the SPF utilizes a considerable amount of valley storage causing the peak outflow to occur 6 to 8 hours after the peak inflow. Plate B-9 shows a plot of the elevation hydrographs for the Connecticut River at Hartford for the largest floods of record and the discharge hydrograph of the Park River for the August 1955 flood. It is noted that during the August 1955 flood the Connecticut River peaked only 12 hours after the peak flow on the Park River and at the time of the Park River peak discharge, the Connecticut River was at elevation 26 feet msl and rising about 0.7 feet per hour. High stages on the Connecticut River concurrent with a SPF on the Park River could result from a downstream flood similar to that of August 1955 rather than a general basin flood similar to that of March 1936. For design conditions it was assumed that the Connecticut River was at elevation 30 feet msl at the time of peak outflow from the Park River. Although the Connecticut River has experienced higher stages (37.6 feet in March 1936) it is considered that a high degree of protection will be provided using this design criterion.

c. Effect of open sections in conduit extension. The existing Park River conduit constructed by the Corps of Engineers in 1944, terminated at Bushnell Park about 1 mile downstream of the confluence of the North and South Branches. It is a twin-barrelled conduit, each section about 19.5 feet high and 30 feet wide and contains a total area of 1,160 square feet.

The Connecticut Highway Department has completed two separate sections of conduit extension on the Park River totaling 2,900 feet in length. One section of conduit extension enclosing 2,760 feet of the North Branch and one section enclosing 1,460 feet of the South Branch are now under construction and are shown on plate B-2.

Invert elevations of the conduit sections are approximately 5 to 10 feet lower than the existing riverbed. In order to gain any beneficial effect from the new sections, the remaining portion of the Park River would have to be improved by lowering and widening the river bottom. An improved 30-foot, concrete-lined channel with 1 on 2 side slopes would provide about the same discharge capacity as the conduit extension sections. The improved channel, however, would not provide protection for the SPF unless the banks were either walled or diked or the channel enclosed in a conduit. Because of physical site limitations it was not possible to construct dikes to contain the flood. Although construction cost studies indicated that it would cost about the same either to enclose the channel in a conduit or to provide floodwalls, added benefits

would be derived from enclosing the river in a conduit.

d. Maximum allowable ponding. Initial studies indicated that due to physical limitations it would not be possible to construct an auxiliary conduit large enough to carry the SPF by gravity flow. In order to reduce the size of the auxiliary conduit, the conduit system was surcharged and the peak inflow modified by the valley storage in the lower portions of the North and South Branches. The conduit entrance was structurally designed for 10 feet of surcharge, which is equivalent to elevation 54.5 feet at the South Branch conduit entrance. Using various size auxiliary conduits in conjunction with the main conduit, the SPF inflows on the two Branches were routed through the valley storage to compute the corresponding ponding elevations. For this analysis it was assumed that the existing Park River conduit was extended up both Branches to the conduit entrances. Standard Project flood ponding elevations for various sized auxiliary conduits, supplementing the main conduit discharges, are listed in the following table:

TABLE B-9

PONDING ELEVATIONS VS.
AUXILIARY CONDUIT SIZES

| Auxiliary Conduit (diameter in feet) | Ponding Elevation Upstream of North and South Branch Conduit Entrances (elevation, feet msl) |
|---|---|
| 0 | 59 |
| 20 | 53.5 |
| 22 | 52 |
| 25 | 50.5 |
| 30 | 48 |

As previously mentioned, the headwall at the South Branch conduit entrance has been constructed to elevation 54.5 feet msl by local interests. A minimum freeboard of 2.5 feet would result in a maximum ponding elevation of 52 feet. The above table shows that a 22-foot auxiliary conduit would result in ponding to 52 feet.

To be compatible with conditions on the South Branch it is proposed to construct a headwall at the North Branch conduit entrance to the same elevation.

9. HYDRAULIC ANALYSIS OF SELECTED PLAN

a. Park River conduit extensions. There are two open sections of conduit which remain and are shown on plate B-2. One length extends from Station 8+68 to Station 21+0, the other from Station 38+10 on the Park River to Station 12+30 on the North Branch. Completion of these conduit extensions will make the Park River conduit continuous from the Connecticut River to the entrances on the North and South Branches. The sections will conform in size and shape to be consistent with the existing conduits as follows:

Park River - each barrel 26.5 feet high by 34 feet wide
North Branch - each 25 feet by 22 feet wide
South Branch - each 27.5 feet by 36 feet wide

Typical conduit sections are shown on plates E-3 and E-4. Rating curves were also computed (n=.013) for normal flows and with various coincident Connecticut River elevations and are shown on plate B-11.

b. Auxiliary conduit. A 22-foot diameter conduit will be constructed to supplement the capacity of the main conduit during large floods. The conduit will extend from the junction structure eastward to the Connecticut River, a distance of approximately 9,500 feet and is shown on plates B-2 and E-5. Provisionally, the invert of the auxiliary at the junction structure (Station 99+0) is plus 16 feet msl. It slopes to minus 12 feet at Station 45+0 and then to minus 14 feet msl at exit portal (Station 8+50). The invert elevation in the lower portion of the conduit was governed by existing street and interstate highway grades. A discharge rating curve at station 98+0 is shown on plate B-11. With the Connecticut River at elevation 30 feet msl and the head pools at elevation 52 feet msl, the discharge capacity of the auxiliary conduit is about 5,500 cfs. Diversion of floodflows into this conduit would tentatively begin when Park River flows exceed 1,500 cfs (about 20 csm.).

10. INTERIOR DRAINAGE

a. General. The interior drainage analysis was performed in accordance with procedures outlined in EM 1110-2-1410 "Interior Drainage of Leveed Urban Areas: Hydrology."

b. Description. The area affected by the proposed plan of improvements extends upstream on the Park River from about Broad Street to the vicinity of Farmington Avenue on the North Branch and Hamilton Street on the South Branch. A portion of the area also has been affected by the construction of the route 84 interstate highway system. This area has been primarily developed for residential, commercial and industrial purposes with park land comprising a small portion.

The storm drainage system is separate from the sanitary sewer system, and includes drains from both high and low level areas. High level drains discharge directly to the Park River through the conduit wall and can be surcharged during high conduit stages without causing damage. The high level drainage systems were designed by the Greater Hartford Flood Commission to discharge runoff from a 25-year storm, and have been constructed in conjunction with completed sections of the conduit extensions.

The low level drainage area comprises 171 acres almost all of which are used for residential, commercial or industrial purposes. A class I category (concentrated commercial and industrial sections) has been selected as being indicative of the area. The topography is relatively flat. The GHFC has designed the low level drainage system to carry flows from a 50-year storm and portions of the collector systems have been constructed adjacent to the completed sections of the conduit extensions. This system is divided into four collector drains which will convey the flow into a pumping station. Gravity flow will occur when low or moderate river stages in the conduit occur, but pumping will be required during high conduit stages. Pertinent data on the four storm drains designed by GHFC are listed below:

| Storm Drain Size (dia. in inches) | Drainage Area (acres) | Gravity Discharge-Design Flow (cfs) |
|---|---|---|
| 84 | 102 | 250 |
| 72 | 54 | 137 |
| 36 | 10 | 33 |
| 15 | 5 | 8 |
| TOTAL | 171 | 428 |

The pumping station will be provisionally designed to discharge a flow of 428 cfs through the gravity outfall.

c. Coincident riverflows and interior runoff.

(1) General. Preliminary studies indicate that pumps will not be necessary to discharge interior runoff when river stages in the conduit are below 28 feet msl at the pumping station, equivalent to flows less than 5,000 cfs. This insures a satisfactory gradient in the drainage system during gravity flow. As previously noted: (a) the proposed conduit invert is considerably lower than the existing river bottom, see plate E-2, and (b) diversion of floodflows into the auxiliary conduit occurs when riverflows exceed 1,500 cfs.

(2) Experienced coincident rainfall. The five largest

floods of record on the Park River are shown in table B-5. A study of the Hartford rainfall records show the most intense rainfalls that occurred concurrently with the Park River flows above 4,000 cfs to be the following:

August 1955 Q = 4,500 cfs, rainfall = 1.35 inch/hour
September 1938 Q = 5,100 cfs, rainfall = 0.75 inch/hour

All other concurrent rainfall for flows above 4,000 cfs had intensities less than 0.25 inch/hour.

d. Design rainfall and runoff. A 5-year, 1-hour rainfall of 1.65 inches per hour has been selected as occurring during periods when the conduit stages are high enough to necessitate pumping. The furthest point from the pumping station in the low level drainage area is 5,500 feet which results in a concentration time of about 30 minutes. Using the rational formula, $Q = cia$, to determine a peak flow, with $c = 0.65$, $i = 2.6"/hr.$, $a = 171$ acres, results in a discharge of 290 cfs.

e. Pumping station. The pumping station has been tentatively located on the right bank of the Park River in the vicinity of Riverside Street and will collect runoff from both sides of the river. The pumps will discharge a flow of 250 cfs, equivalent to 1.5 inches of runoff per hour, against a head differential of about 30 feet which would occur during a standard project flood.

f. Ponding. With the inclosure of the Park River in a conduit, the area adjacent to and over the river will increase in value due to economic development. For this reason, it is not considered feasible to reserve areas for temporary storage of interior floodflows during periods when pumping is required. It is possible to allow ponding in streets, parking areas, etc. for short periods of time, but the potential ponding and subsequent damages cannot be adequately determined at this time due to the considerable amount of conduit construction and urban redevelopment presently taking place. During the preparation of the design memorandum, further consideration will be given to the adequacy and design of the gravity outfall, pumping capacity, ponding and potential damage.

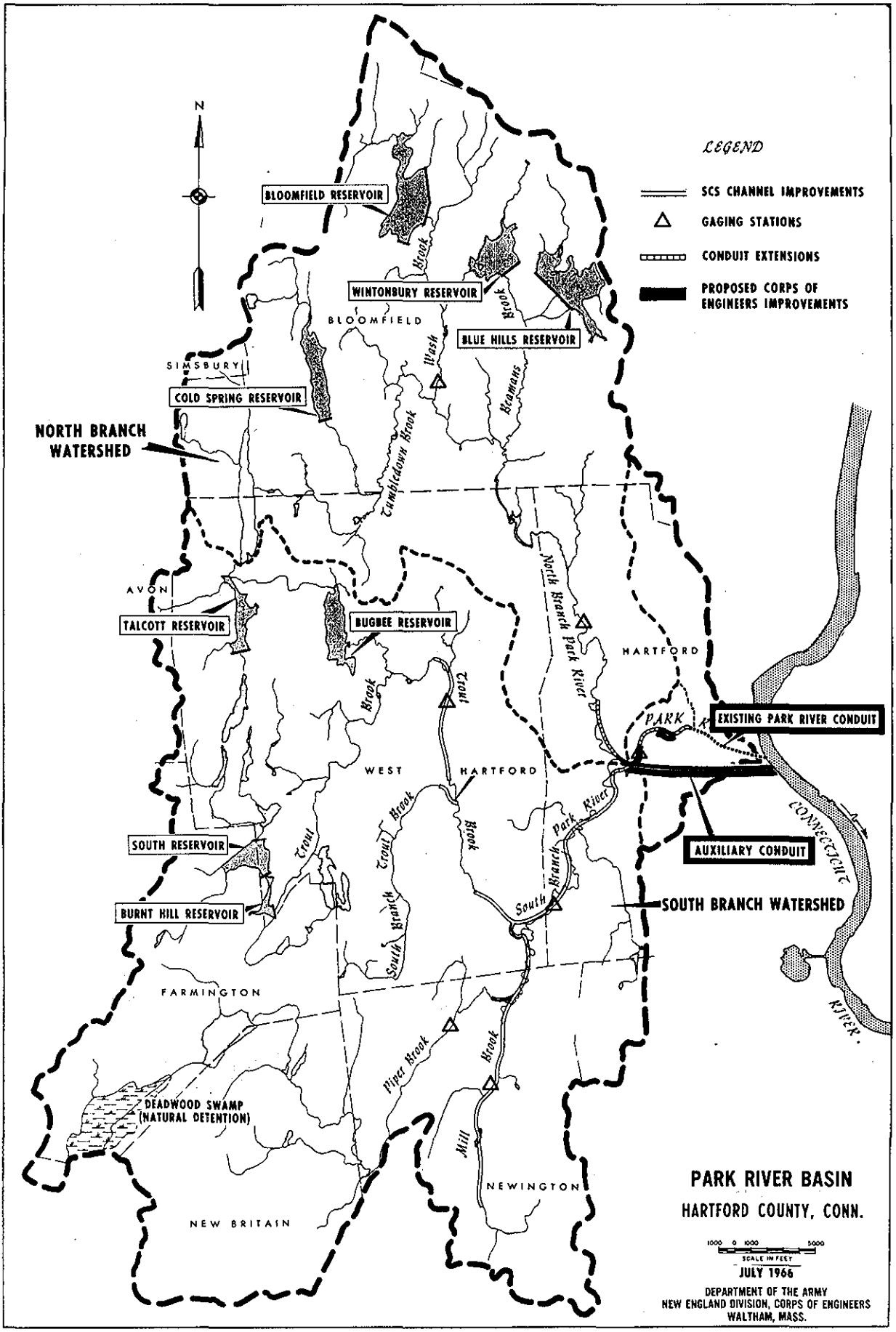
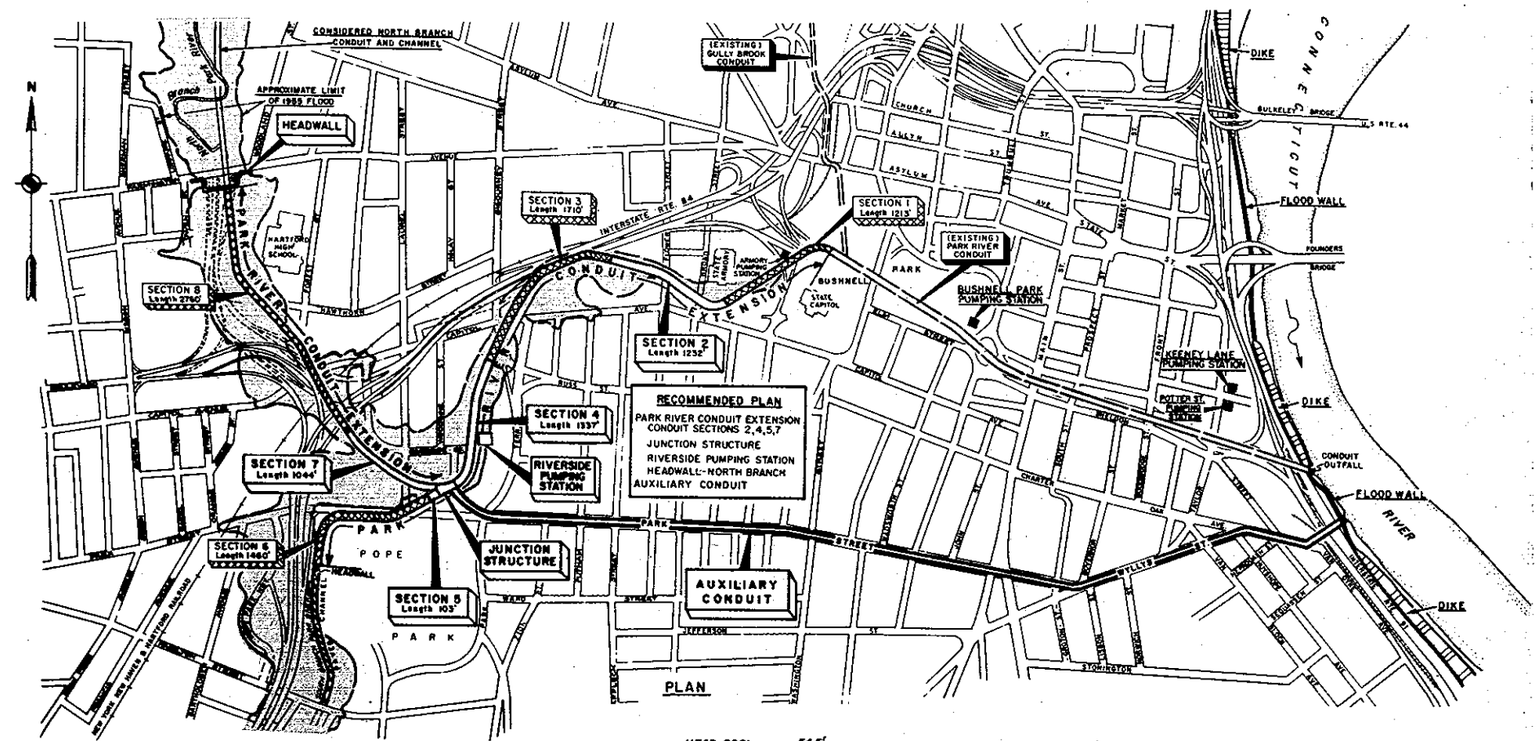

N
LEGEND
SCS CHANNEL IMPROVEMENTS
GAGING STATIONS
CONDUIT EXTENSIONS
PROPOSED CORPS OF ENGINEERS IMPROVEMENTS
BLOOMFIELD RESERVOIR
WINTONBURY RESERVOIR
BLUE HILLS RESERVOIR
COLD SPRING RESERVOIR
TALCOTT RESERVOIR
BUGBEE RESERVOIR
SOUTH RESERVOIR
BURNT HILL RESERVOIR
NORTH BRANCH WATERSHED
SOUTH BRANCH WATERSHED
EXISTING PARK RIVER CONDUIT
AUXILIARY CONDUIT
DEADWOOD SWAMP (NATURAL DETENTION)
BLOOMFIELD
SIMSBURY
AVON
WEST HARTFORD
HARTFORD
FARMINGTON
NEWINGTON
NEW BRITAIN
Wash Brook
Beamans Brook
Tumbledown Brook
North Branch Park River
Trout Brook
South Branch Park River
Piper Brook
Mill Brook
PARK RIVER BASIN
HARTFORD COUNTY, CONN.
SCALE IN FEET
JULY 1966
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

**PLATE NO. B-1**

CORPS OF ENGINEERS — U. S. ARMY

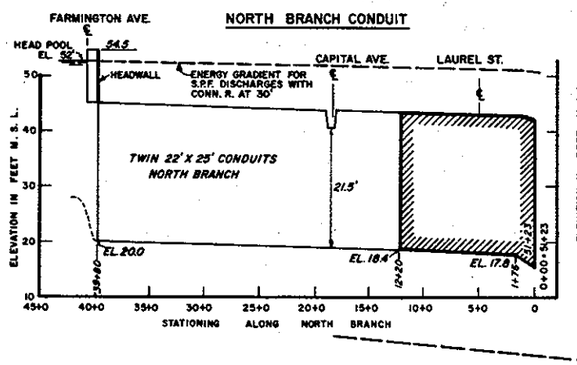



LEGEND

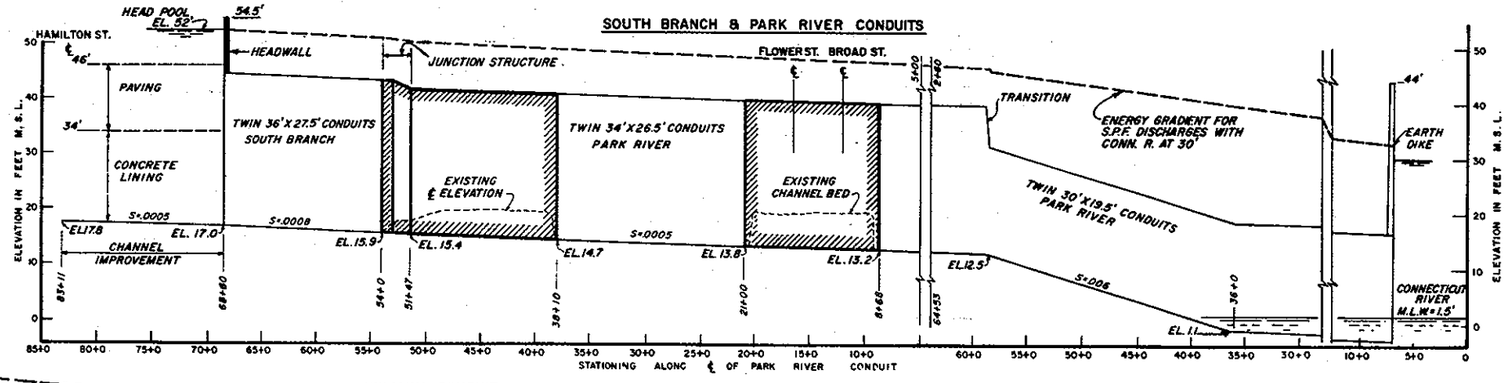
- Approximate Limit of 1955 Flood
- Corps of Engineers, Recommended Plan
- Connecticut Highway Department, Completed or Under Construction

SCALE IN FEET 500' 0 500' 1000'

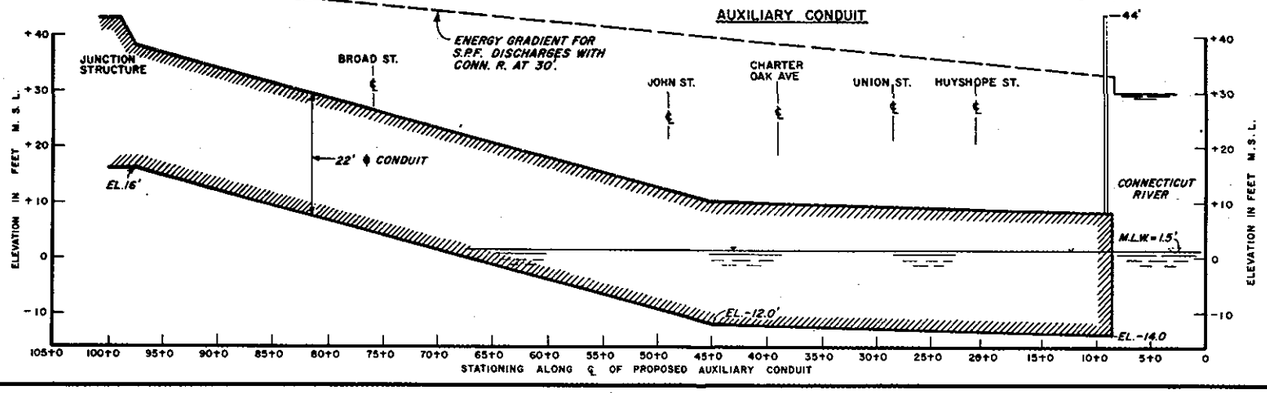
## NORTH BRANCH CONDUIT




## SOUTH BRANCH & PARK RIVER CONDUITS




## AUXILIARY CONDUIT




| REVISION | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

| DR. BY J. W. D. | TR. BY G. H. D. | CK. BY J. M. L. |
|---|---|---|

CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER CONDUIT EXTENSION AND AUXILIARY CONDUIT
GENERAL PLAN & CONDUIT PROFILES
PARK RIVER — CONNECTICUT

SUBMITTED — CHIEF, PLAN. & RPTS BRANCH
APPROVED — CHIEF, ENGINEERING DIVISION — DATE JULY 1966

TO ACCOMPANY REPORT DATED 21 JULY 1966

SCALE AS SHOWN — DRAWING NUMBER — SHEET

PLATE B-2

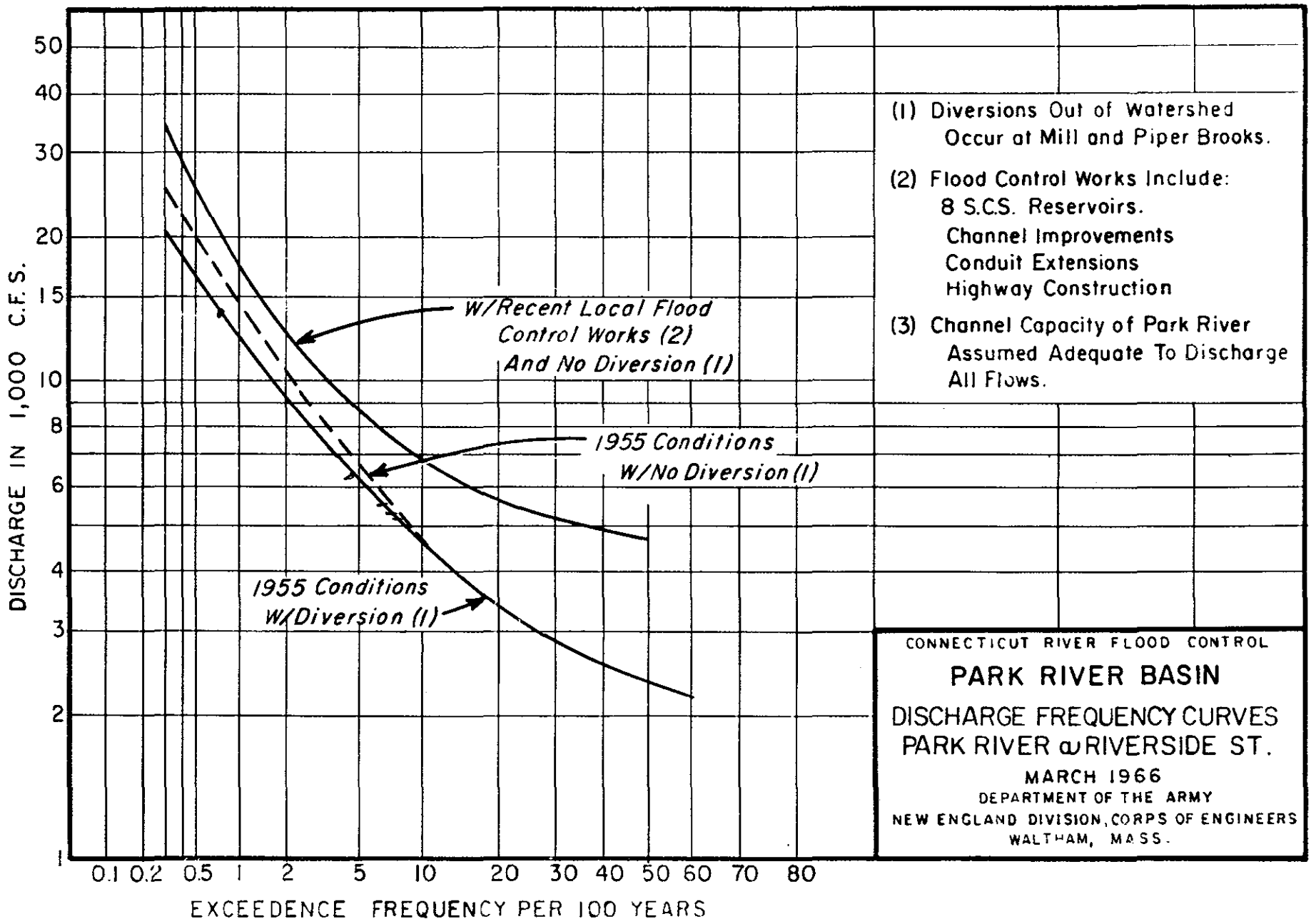
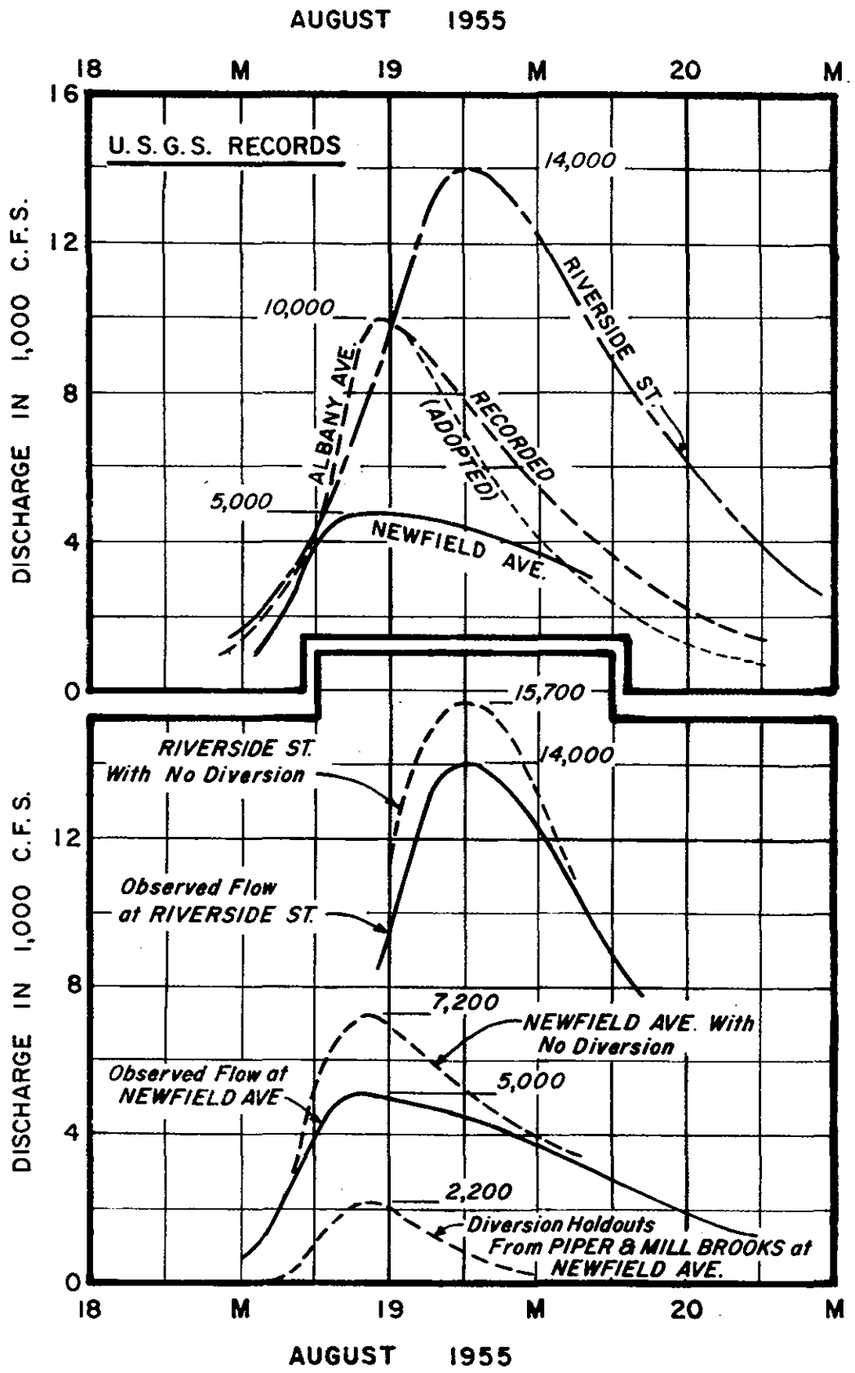
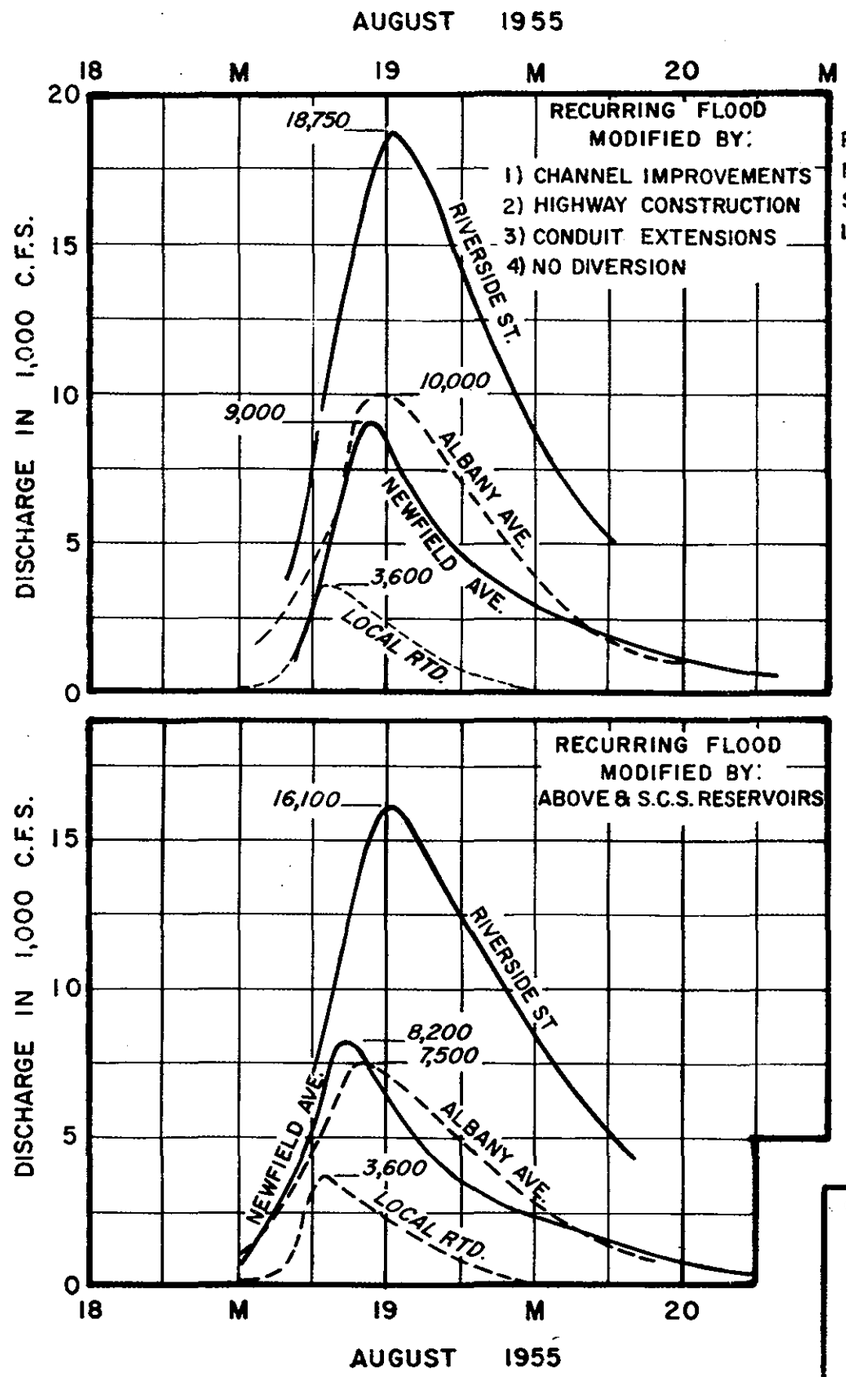

DISCHARGE IN 1,000 C.F.S.
50
40
30
20
15
10
8
6
4
3
2
1
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80
EXCEEDENCE FREQUENCY PER 100 YEARS
W/Recent Local Flood Control Works (2) And No Diversion (1)
1955 Conditions W/No Diversion (1)
1955 Conditions W/Diversion (1)
(1) Diversions Out of Watershed Occur at Mill and Piper Brooks.
(2) Flood Control Works Include:
8 S.C.S. Reservoirs.
Channel Improvements
Conduit Extensions
Highway Construction
(3) Channel Capacity of Park River Assumed Adequate To Discharge All Flows.
CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER BASIN
DISCHARGE FREQUENCY CURVES
PARK RIVER @ RIVERSIDE ST.
MARCH 1966
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE B-3




## DRAINAGE AREAS

| | |
|---|---|
| PARK R. at RIVERSIDE ST. | 74.0 Sq.Mi. |
| N. BRANCH at ALBANY AVE. | 25.3 Sq.Mi. |
| S. BRANCH at NEWFIELD AVE. | 40.6 Sq.Mi. |
| LOCAL on BOTH BRANCHES | 8.1 Sq.Mi. |

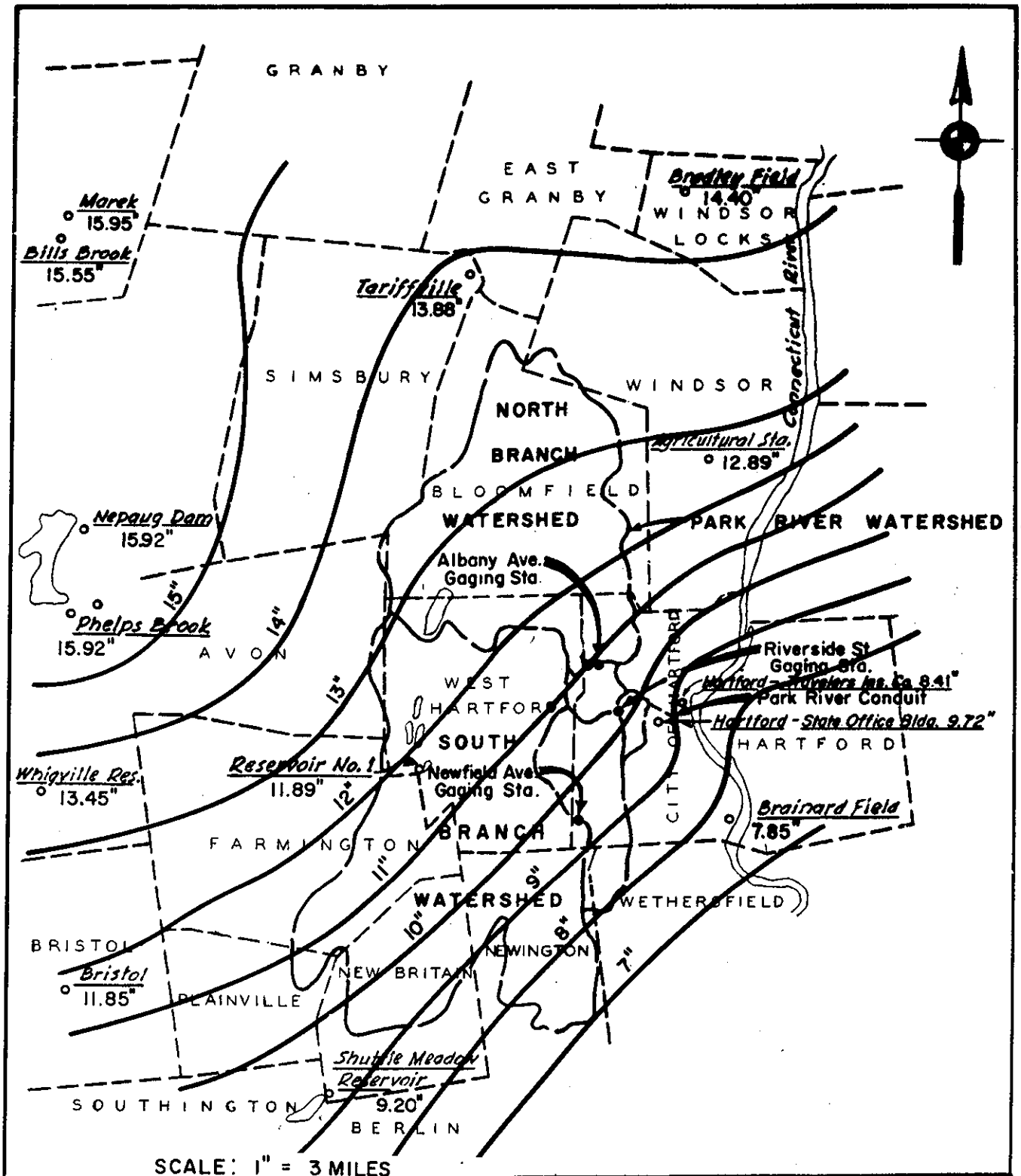
CONNECTICUT RIVER FLOOD CONTROL

# PARK RIVER BASIN
# AUGUST 1955 FLOOD ANALYSIS

MARCH 1966

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE B-4




CONNECTICUT RIVER FLOOD CONTROL

PARK RIVER BASIN

# ISOHYETAL MAP
## STORM OF 17-20 AUGUST 1955

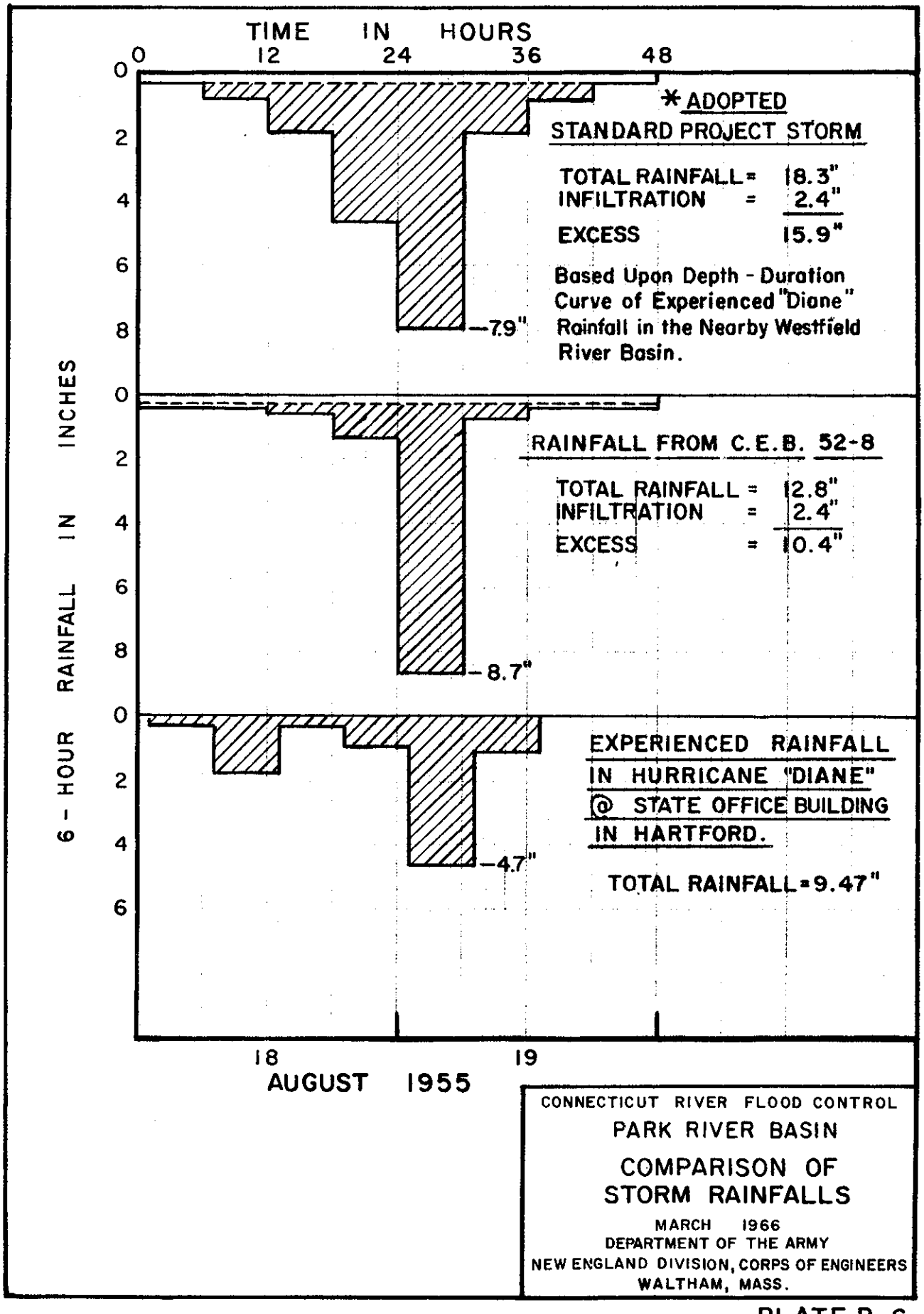
MARCH 1966

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS.

PLATE B-5




CONNECTICUT RIVER FLOOD CONTROL

PARK RIVER BASIN

# COMPARISON OF STORM RAINFALLS

MARCH 1966

DEPARTMENT OF THE ARMY

NEW ENGLAND DIVISION, CORPS OF ENGINEERS

WALTHAM, MASS.

PLATE B-6

## PARK RIVER AT RIVERSIDE ST
## (D.A. = 74.0 SQ. MI.)

RAINFALL EXCESS-INCHES

0

1

DISCHARGE IN C. F. S. 100

30

25

20

15

10

5

0

0 12 24 36 48 60

TIME IN HOURS

NOV. 1937

SEPT. 1938

AUG. 1955

ADOPTED BY M.& E. PRIOR TO ANY IMPROVEMENTS

2,650 C.F.S.

COMPUTED HYDROGRAPH SHOWING EFFECT OF IMPROVEMENTS WITH NO RESERVOIRS

1920 C.F.S.

| FLOOD | PEAK FLOW |
|---|---|
| NOV. 28, 1937 | 2,880 C.F.S. |
| SEPT. 1938 | 5,320 C.F.S. |
| AUG. 1955 | 14,000 C.F.S. |

## NORTH BRANCH PARK RIVER
## AT ALBANY AVE. (D.A.=25.3 SQ.MI.)

AUG. 1955

OCT. 1955

ADOPTED BY M.& E. PRIOR TO ANY IMPROVEMENTS

| FLOOD | PEAK FLOW |
|---|---|
| AUG. 1955 | 10,000 C.F.S. |
| OCT. 1955 | 3,680 C.F.S. |

30

25

20

15

10

5

0

0 12 24 36 48

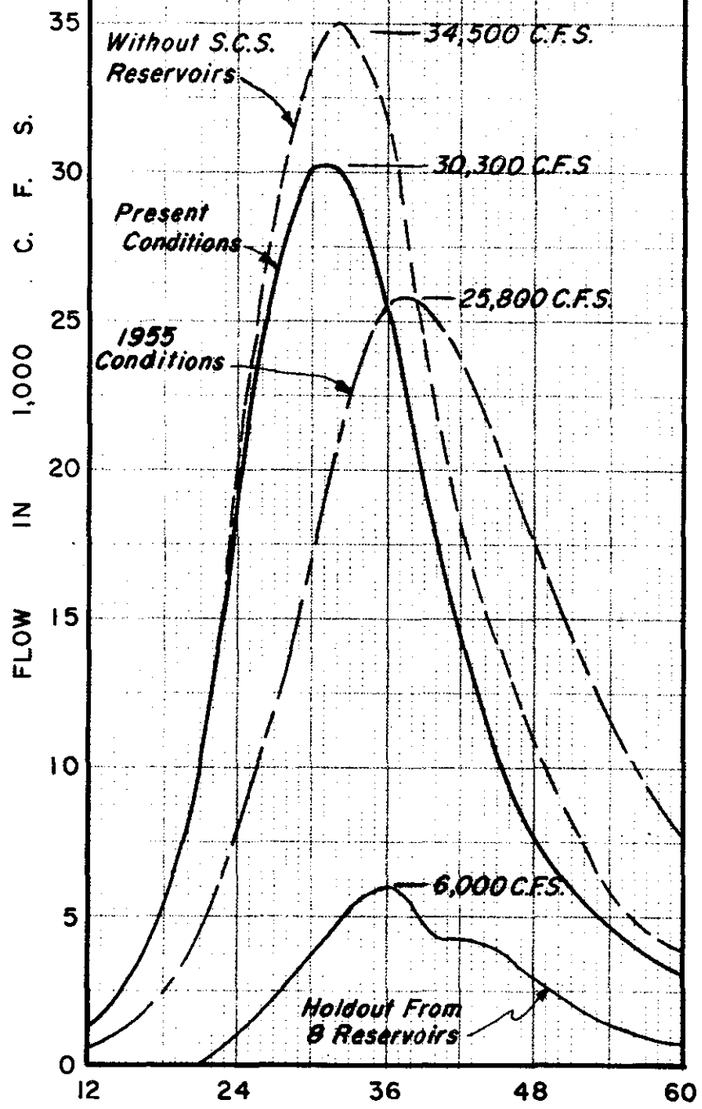
CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER BASIN

# UNIT HYDROGRAPHS

MARCH 1966
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

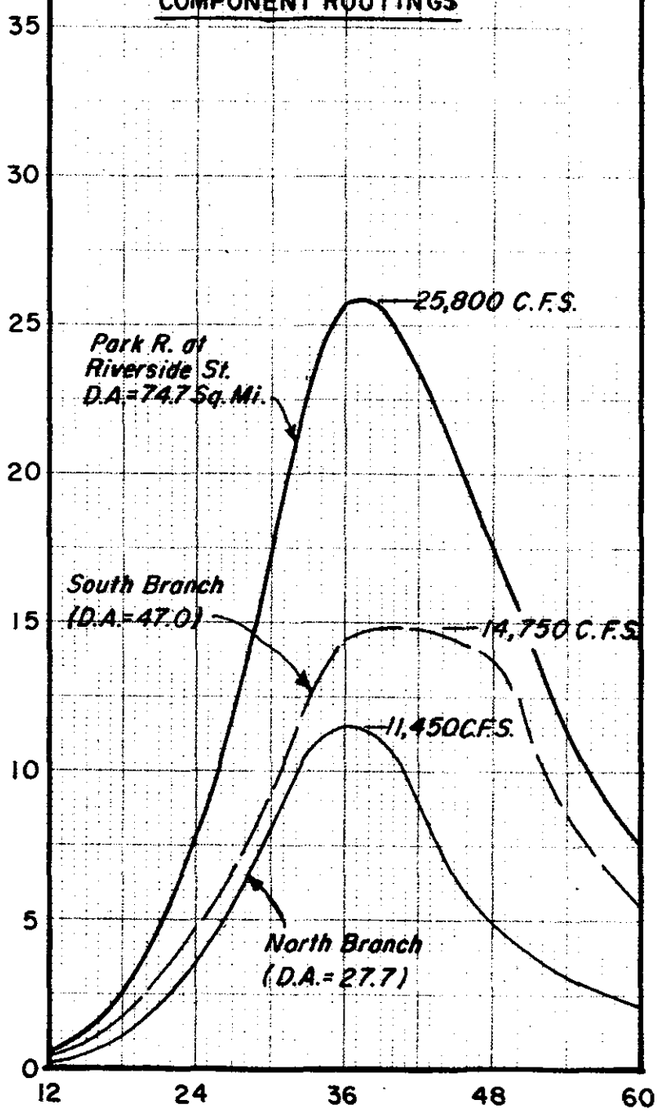
PLATE B-7

## PARK RIVER AT RIVERSIDE STREET




## 1955 CONDITIONS

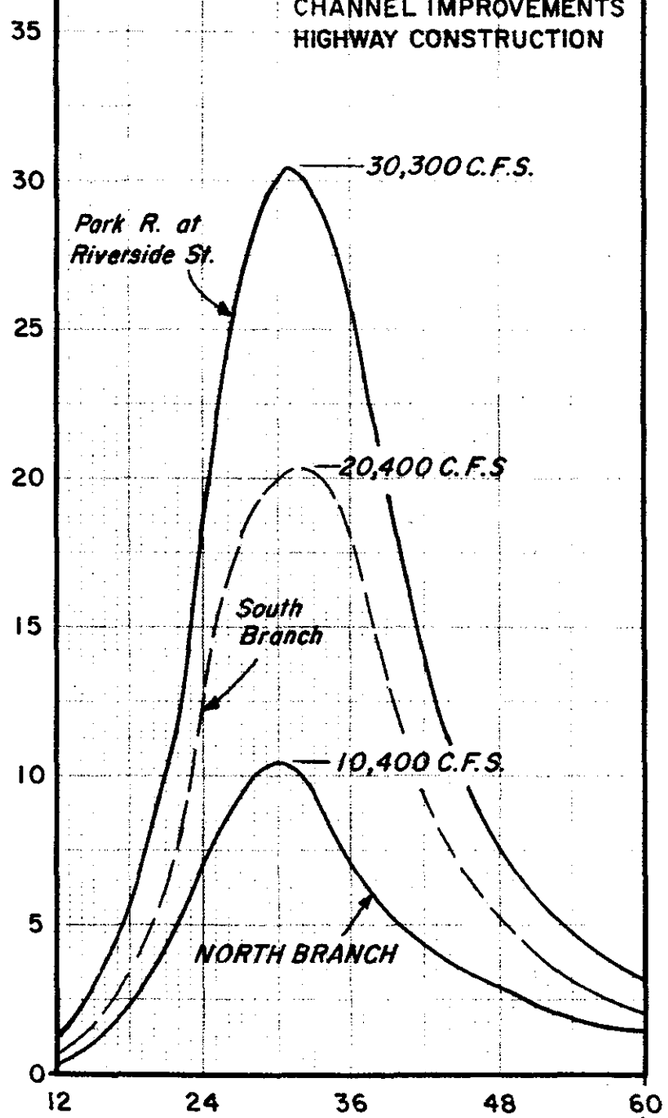
PEAK BASED ON COMPONENT ROUTINGS




TIME IN HOURS

## BASED ON PRESENT CONDITIONS

MODIFIED BY: S.C.S. RESERVOIRS
CHANNEL IMPROVEMENTS
HIGHWAY CONSTRUCTION

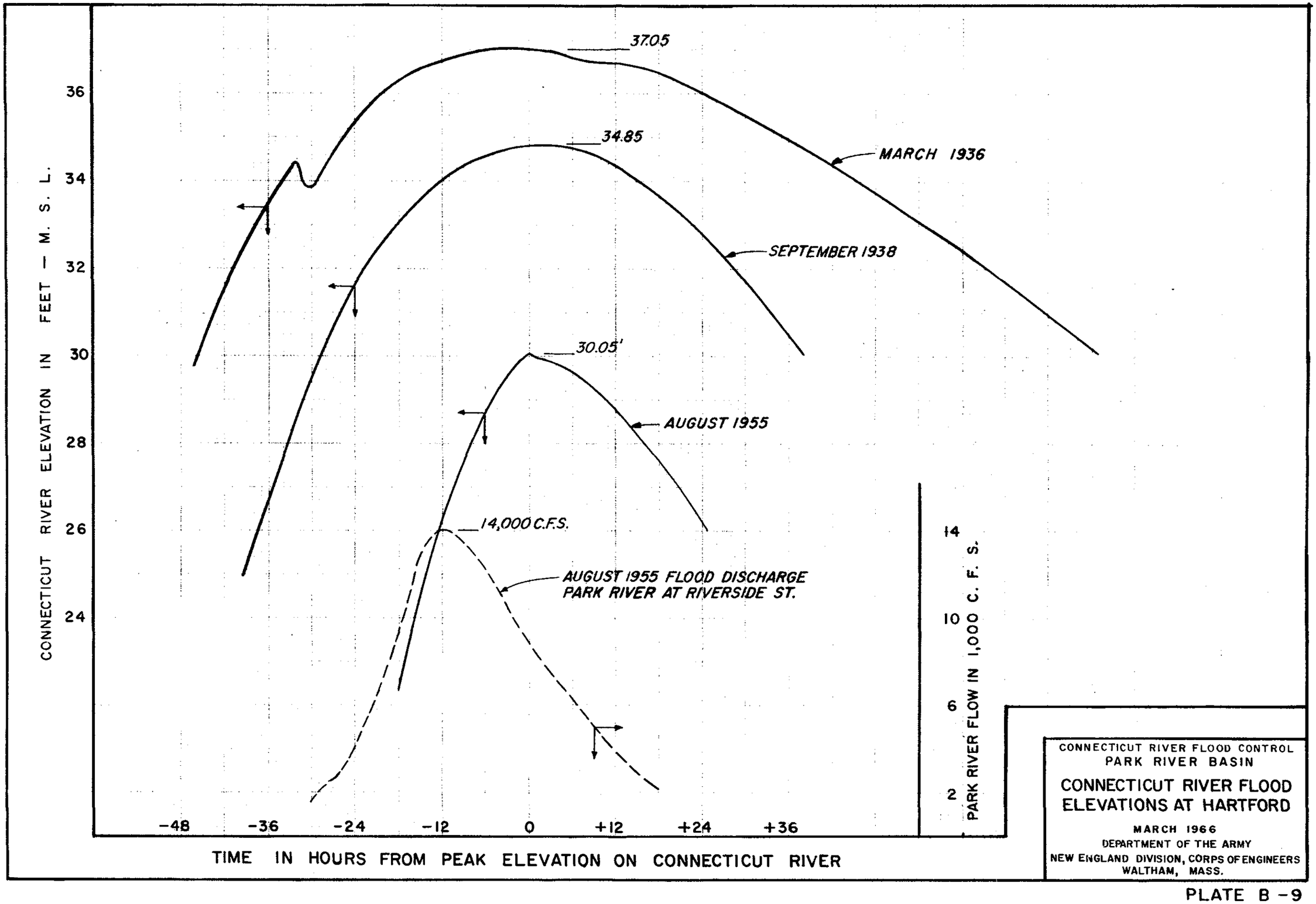



CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER BASIN

STANDARD PROJECT FLOOD

PARK RIVER AT RIVERSIDE ST.
MARCH 1966
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE B-8

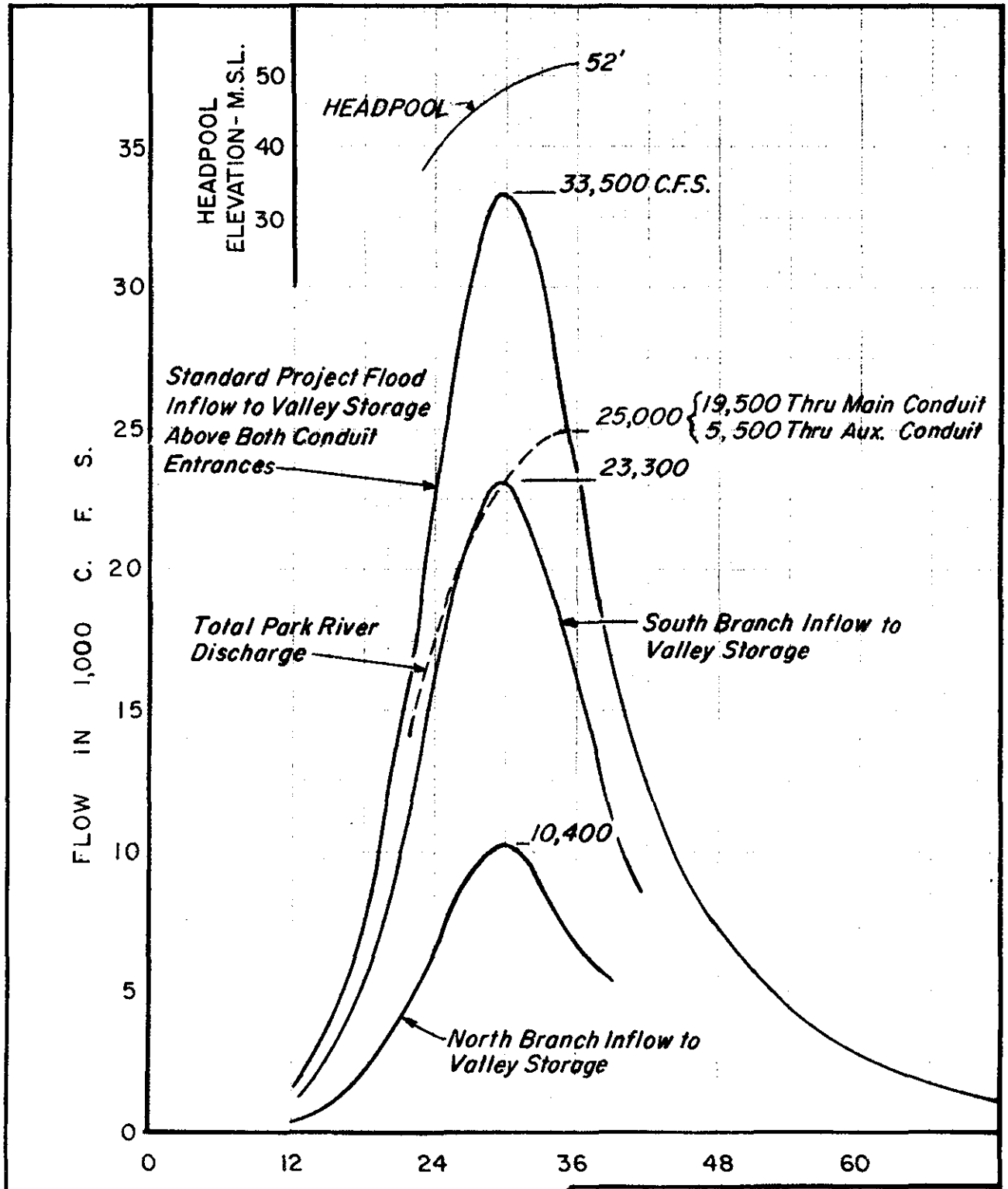



CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER BASIN

# CONNECTICUT RIVER FLOOD ELEVATIONS AT HARTFORD

MARCH 1966
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE B -9

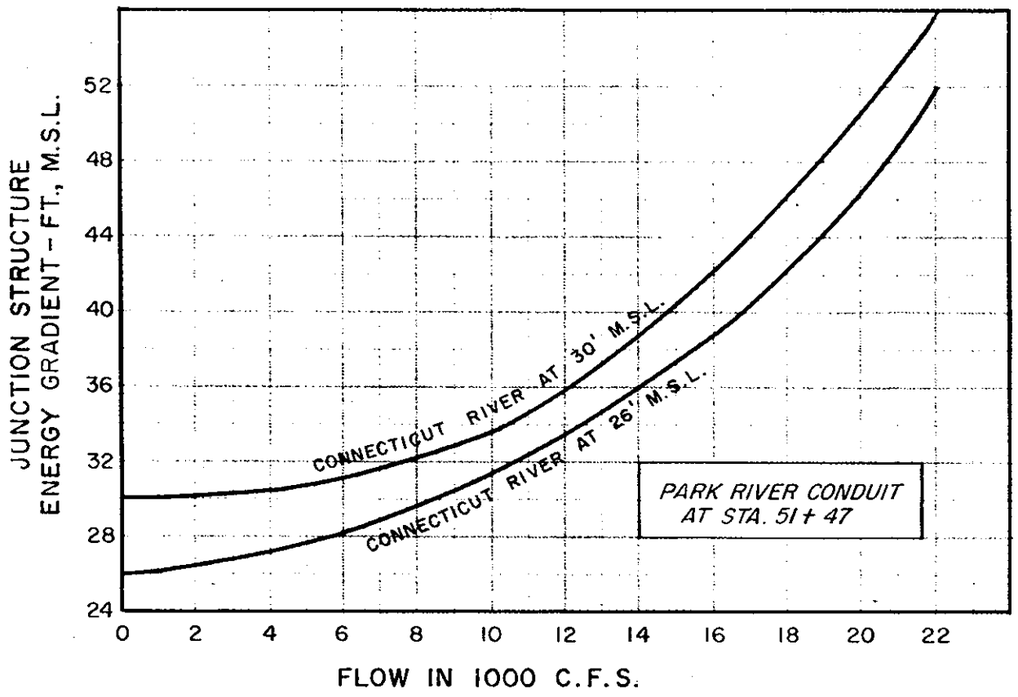


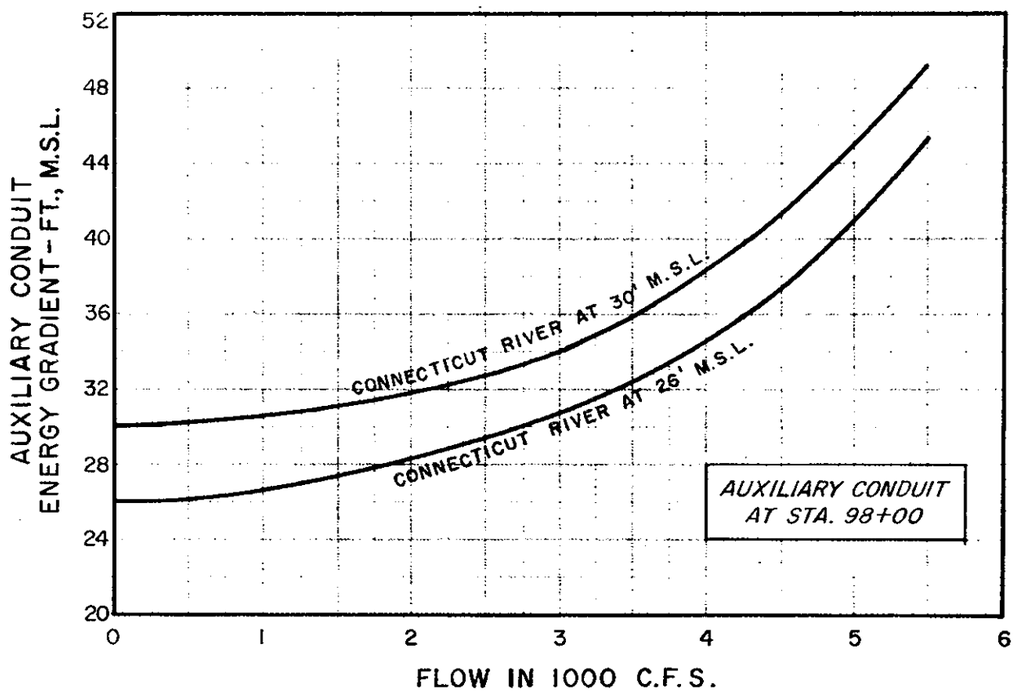

CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER BASIN

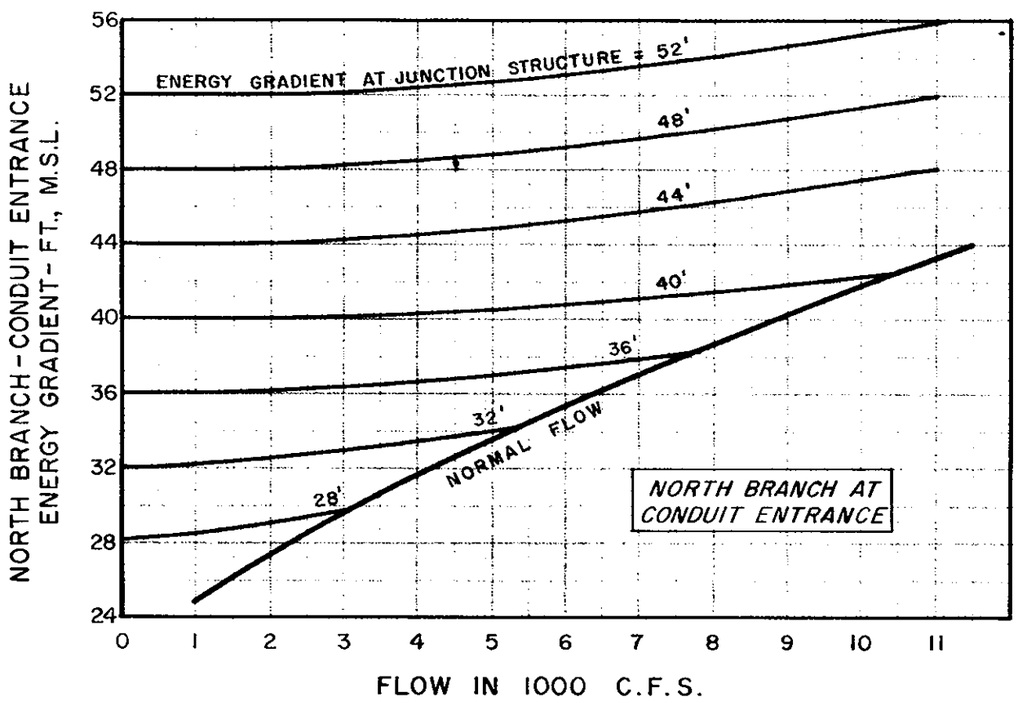
## ROUTING OF S.P.F. THRU MAIN CONDUIT AND 22'ϕ AUXILIARY

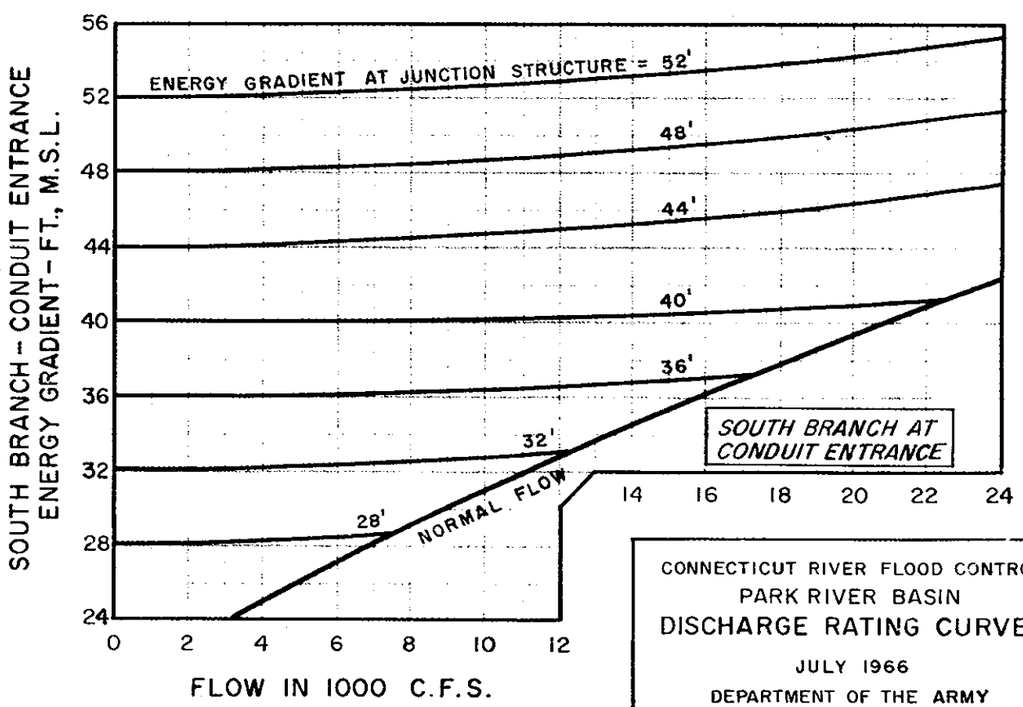
PARK RIVER AT RIVERSIDE ST.
MARCH 1966
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE B-10




CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER BASIN
DISCHARGE RATING CURVES
JULY 1966
DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

PLATE B-11

# APPENDIX C

# ECONOMIC DEVELOPMENT

# APPENDIX C

# ECONOMIC DEVELOPMENT

## TABLE OF CONTENTS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| 1 | GENERAL | C-1 |
| 2 | TRANSPORTATION | C-1 |
| 3 | POPULATION | C-2 |
| 4 | ECONOMY | C-2 |
| 5 | LAND USE | C-2 |
| | FUTURE CONDITIONS | |
| 6 | GENERAL | C-2 |

# APPENDIX C

# ECONOMIC DEVELOPMENT

## PRESENT CONDITIONS

### 1. GENERAL

Hartford is the capital of Connecticut and its most populous city. Located at the head of navigation on the Connecticut River the city lies slightly to the north of the geographic center of the state and is less than an hour's drive from all parts of the state except for lower Fairfield County.

### 2. TRANSPORTATION

The Greater Hartford area is the nexus of the State's Highway system with two of its interstate Highways, I-91 and I-84, and eight state routes connecting the city to all parts of the state and to its adjoining neighbors, New York, Massachusetts and Rhode Island. Construction on I-91 to the south and I-84 to the southwest is in progress and completion is expected well before the 1972 deadline for the entire Interstate System. Both highways are in operation to the Massachusetts line to the north and northeast. To the south and west State Route 15, the Wilbur Cross Parkway, connects the city to Fairfield County and the New York City area. Other major State Routes radiating from the area are 2, 4, 5, 6, 9 and 44.

The New Haven Railroad serves Hartford, providing both freight and passenger service. Passenger trains connect the city to Springfield to the north and New Haven, Bridgeport and New York City to the south. Freight service is furnished with 200 industrial sidings serving 225 industries in the Greater Hartford Area, numerous team tracks for public use and full "piggy-back" service facilities for trailer transport.

Air freight and passenger service for Greater Hartford is supplied at Bradley Field in Windsor Locks, about 25 minutes drive from the center of Hartford. Seven passenger carrying airlines serve the airport; Alleghany, American, Eastern and Mohawk, Northeast, TWA and United.

The Connecticut River is navigable with a 15-foot improved channel from Long Island Sound to Hartford. In 1963, the last year for which complete data are available, tonnage of water borne products on the

river amounted to 3,000,000 tons. Over 95 percent of the tonnage was petroleum products, the balance being bituminous coal and some bulk chemical products.

3. POPULATION

Hartford is the core city of an SMSA with a 1960 population of 525,207. During the decade 1950-1960 the core city declined in population by 8.6 percent following the nation-wide trend of movement to the suburbs but the SMSA had a growth of 29.2 percent overall, exceeding the growth rate of the state (26.3 percent) and of Hartford County as a whole.

4. ECONOMY

The economy of Hartford is a vigorous one, with a diversified mix of manufacturing, wholesale and retail trade, insurance and finance. Government is also a larger than normal employer in Hartford with the state government centered there. The home offices of several of the country's largest insurance companies in their respective fields are located in Hartford. Total employment in the insurance industry amounts to approximately 10 percent of the work force in the Hartford Labor Market Area. Manufacturing, the largest single employer in the Hartford Labor Market Area, accounts for 32.4 percent of the labor force. Among its principal products, in Hartford, are typewriters, small arms, ball bearings and electrical equipment. The city is also the shopping center for central Connecticut and trade and services are important employers. The unemployment rate, 3.7 percent in March 1965 was 16 percent below the National average.

5. LAND USE

Based on 1960 Census data Hartford has a gross population density of 8719 per square mile. When the areas of the public parks and state owned facilities in the city are taken into account the density is in excess of 12,000 per square mile. Past practice in building was such that there is little vacant land available for new construction.

FUTURE CONDITIONS

6. GENERAL

All indicators point to a continuing growth in economic activity and population for the SMSA of which Hartford is the center. The

Capital Region Planning Agency, a State sponsored agency, in a report in 1961 projected a population growth of two and a half times in the next 50 years for the Hartford area. Data from a projective Economic Study of New England and parts thereof being prosecuted in connection with the Comprehensive Survey of the Connecticut River Basin confirms the Region Planning Agency's projection and indicates a continuing rise in the level of economic activity.

Such a growth in population with the increase in economic activity necessary to support it will place such a demand on land in Hartford that every usable plot and existing building will be put to its highest use. Because of its location in the heart of Hartford the flood plain of the Park River will feel the demand as soon as protection is provided.

# APPENDIX D

# FLOOD LOSSES AND BENEFITS

# APPENDIX D

## FLOOD LOSSES AND BENEFITS

## TABLE OF CONTENTS


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| 2 | LOSS CLASSIFICATION | D-1 |
| 3 | RECURRING LOSSES | D-2 |
| 4 | ANNUAL LOSSES | D-2 |
| | a. Present Conditions | D-2 |
| | b. Future Conditions | D-3 |
| 5 | TANGIBLE FLOOD DAMAGE PREVENTION BENEFITS | D-4 |


## Plates


| Plate No. | |
|---|---|
| D-1 | Damage-Frequency Curve, Park River Basin |
| D-2 | Stage-Damage Curve, Park River Basin |

# APPENDIX D

# FLOOD LOSSES AND BENEFITS

## 1. DAMAGE SURVEYS

Following the flood of August 1955, the Greater Hartford Flood Control Commission engaged a private engineering company to make a survey of the damages. Physical losses and some non-physical losses were evaluated. Much of the data collected in the survey was rendered obsolete by changes in use and by land taking in connection with construction of Interstate Route I-84, which traverses the basin. In 1964 and early 1965, Corps of Engineers personnel made a damage survey of the basin. Data from the earlier survey were used to determine depths of flooding but a complete re-evaluation of losses was made in the light of current physical and economic conditions. The damage survey consisted of door-to-door interviews and inspections of residential, commercial, industrial and other properties within the flood plain. Recorded information included extent of the areas flooded, description of the properties, nature and amount of damages, depth of flooding, high water references and relationships to prior flood stages. Damage data were generally furnished by property owners or tenants. Engineers and analysts prepared estimates on the basis of these data and developed their own estimates when owner or tenant estimates were unavailable.

Sufficient data were obtained to derive losses for: (1) the 1955 flood crest, (2) a stage 5 feet higher, (3) the stage where damage begins referenced to the 1955 flood crest, and (4) intermediate stages where marked increases in damage occur.

## 2. LOSS CLASSIFICATION

Flood loss information was recorded by type of loss and by location. Primary losses evaluated include (1) physical losses, such as damage to structures, equipment and machinery, raw and finished stock, cost of cleanup and repairs, and (2) non-physical losses, such as unrecoverable loss of business and wages, cost of emergency services and increased cost of operation.

Primary losses resulting from physical damage and a large part of the related non-physical loss were determined by direct inspection of property and evaluation of losses by property owners and field investigators. Where non-physical portions of primary losses could not be directly determined with available data, estimates were based upon the relationship between physical and non-physical losses for similar properties in the area.

3. RECURRING LOSSES

A recurrence of the record flood levels of August 1955 under 1965 conditions in the Park River Basin would cause losses estimated at $6,750,000 in the reaches of the river between the present end of the Park River Conduit and Flatbush Avenue on the South Branch and Albany Avenue on the North Branch.

Over 58 percent of the losses would be concentrated in the portion of the basin between Broad Street on the downstream end of the main stem and Hamilton Street on the South Branch and Farmington Avenue on the North Branch. Here, three industrial concerns with payrolls of more than 3,000 employees, thirty-six small manufacturing ventures and thirty-nine commercial establishments employing an added 2,000 people lie in the flood plain. Total losses in this zone would amount to $3,930,000 under current conditions.

Upstream of Farmington Avenue, a loss of $1,900,000 could be expected along the 2.1 mile stretch of the North Branch to Albany Avenue. While the largest single type of loss would be residential, industrial and public losses would also occur in the reach.

On the South Branch, from Hamilton Street upstream to Flatbush Avenue, losses would amount to $950,000. Approximately 30 percent of the loss would be industrial in character with much of the remaining loss being suffered by residential property.

4. ANNUAL LOSSES

a. Present Conditions. Estimated recurring losses for various stages of flooding under present conditions in the studied area were combined with stage frequency data to derive damage-frequency relationships as a measure of annual losses. The stage frequency data reflected conditions to be expected after construction of all authorized Soil Conservation Service projects on the North and South Branches of the Park River. Annual losses amount to $1,037,500 in the studied area, broken down as follows:

| | |
|---|---|
| Main Stem Park River, North Branch to Farmington Avenue and South Branch to Hamilton Street | $ 883,600 |
| North Branch, Farmington Avenue to Albany Avenue | 18,600 |
| South Branch, Hamilton Street to Flatbush Avenue | 16,100 |
| Conn. River Dike Area in Hartford | 119,200 |

b. Future Conditions. As discussed in Appendix C, Economic Development, the flood plain of the Park River in the studied area will have more intensive land use in the future than at present. Adjustments in annual losses were made to reflect the future conditions which could be positively identified. In addition, for those areas where definite forecasts could not be made, an increase in losses expressed as a percentage of the present loss and based on current trends in the areas was made. Derivation of annual losses and benefits for a typical reach of the Park River is shown on Plates D-1 and D-2.

For the properties along the Park River between the present conduit entrance and Capitol Avenue use and occupancy since the flood of 1955 has been about 40 percent of actual capacity based on highest and best use. Demand for space both for light industrial use and for wholesale commercial needs in Hartford are such that with the flood threat removed these properties would once more be put to their best use. The future losses under such conditions would increase in proportion to the increase in usage. Annual losses under current conditions in the area amount to $41,400. Higher usage would increase these losses by $62,100 annually. The increase in use and occupancy could be expected to start with project completion and be complete by the end of the third year. Discounted at 3-1/8 percent, the equivalent annual loss amounts to $60,200.

For the Underwood Urban Renewal area, a square foot annual loss for the Underwood and Merrow properties under current conditions was derived. The square foot loss value was arrived at by dividing the total annual loss for the two properties by the total land area of the two properties. A square foot loss value of $0.776 was derived in this manner. As the depth of flooding in the area planned for future industrial construction would be the same as for the two

existing plants and as both plants are modern in their equipment the value is a reasonable one to be used for future losses provided intensity of land use remains the same. However, land use regulations under the Redevelopment Plan preclude any such intensity of use so the value was reduced 50 percent to comply with land use practices proposed under the Plan. There are 473,000 square feet of land set aside for industrial development in the Renewal area. It is estimated that the development will start in the area with the start of conduit construction and take place uniformly over the next ten years. The additional annual loss in the area will be ($0.77 x 473,000 x .5 x .86801)-($13,800)* = $169,700.

The 8-acre tract of land upstream of the Urban Renewal Area and bounded by Laurel Street, Park Street, Interstate Route I-84 and the river will be put to use with protection. The property was formerly occupied by a large foundry. Land taking in connection with Interstate Route I-84 took two acres of the original property and precluded access to the back of the foundry except for a railroad spur. The property has been sold to an investor and the buildings are being demolished. Future annual losses in this area were arrived at using the square foot loss value derived for the Urban Renewal Area adjusted to reflect the restrictive effect of the existing highway system on access and circulation. Development is projected to take place within 5 years of project completion and losses were discounted for that period using a 3-1/8 interest rate. Future annual losses so derived amount to $93,600.

No attempt was made to project future conditions on the North Branch and the South Branch of the Park River above Farmington Avenue and Hamilton Street respectively. Total annual losses on the main stem of the Park River and its branches to Hamilton Street and Farmington Avenue amount to $1,207,000 over the life of the project.

## 5. TANGIBLE FLOOD DAMAGE PREVENTION BENEFITS

Tangible flood damage prevention benefits to the various studied plans of protection were derived as the difference between annual losses expected over the project life without protection and the annual losses remaining after provision of the recommended plan of protection. Annual benefits so derived amount to $1,160,000.

The existing flood control improvements at Hartford provide a high degree of protection from Connecticut River flooding. The



*Annual loss for present residential and commercial property to be removed.

recommended project will provide equivalent protection from Park River flood runoff.

As an index of the effects of floods exceeding the capacity of the existing conduit and flooding downtown Hartford, data was obtained from the Hartford Clearing House on the dollar volume of daily transactions. At the present time the daily clearings are in excess of $20,000,000 and they are growing at a monthly rate of 1 1/2 percent.

A flood of a magnitude which exceeded the conduit capacity would take from 5 to 7 days to recede in the North and South Meadow areas of Hartford. Over and above the damages caused by the flood in the flood plain proper, there would be a large decrease in the business activity of Hartford because of the lack of access from the east of Hartford and the extreme congestion caused by the loss of use of the area's principal north-south route through the Meadows. This decrease would be directly measured by the clearing house receipts. While it is estimated that some 90 percent of the decreased activity would represent simply a deferral, the other 10 percent would be lost forever. Therefore, such a flood would cause business losses in Hartford of $10,000,000 to $14,000,000 over and above the losses in the flood plain. On an annual basis this amounts to $140,000 annually. Construction of the auxiliary conduit would prevent these losses.

Construction of the conduit will obviate the need for four existing bridges over the Park River and its North Branch at Broad Street, Flower Street, and Laurel Street. None of the bridges are modern; all would have to be replaced over the life of the project. The estimated replacement costs of the bridges is $275,000. Annual maintenance costs for the bridges amount to $1,140. The annual savings to the City of Hartford at these four locations amount to the amortized costs plus maintenance.

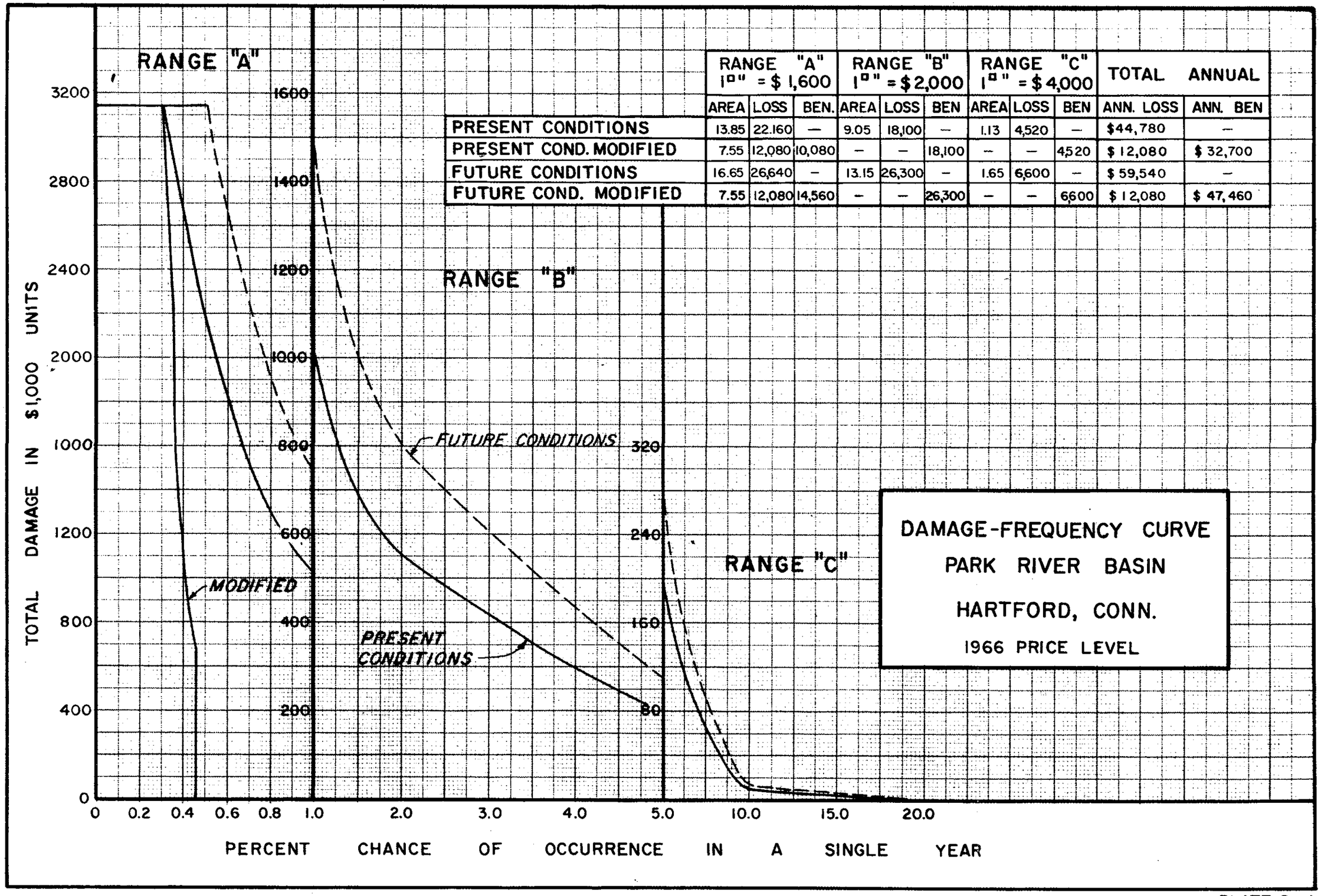
| | | |
|---|---|---|
| 275,000 x 0.03276 | $ 9,009 | |
| Annual Maintenance | 1,090 | |
| | $10,099 | |
| Called | $10,000 | |

In the reaches of the river between Broad Street and Capitol Avenue on the main stem and between Laurel Street and Interstate Route I-84 on the North Branch the area on top of the conduit can satisfy an urgent need for parking for employees of the industries and commercial ventures along the river. This use is incidental to normal conduit usage. The need for parking is so critical that one of the largest employers in the neighborhood has threatened to close his plant and move elsewhere unless some relief is afforded for the parking situation. Over 10 acres of space formerly used for parking in this area has been taken by the State for construction of Interstate Route I-84. The State Highway Department and the Hartford Traffic Commission have already entered into an agreement whereby space under the over-passes and interchanges on Route I-84 will be leased to the City on nominal terms and be adapted to parking by the city. This will do little to alleviate the parking problem because of the various configurations and limited amount of such space. Moreover, the locations, at interchanges and local street over-passes, will aggravate the traffic problem on the local ways because of access and egress from the parking areas into congested traffic.

An investigation was made into the rate of annual earnings for parking space for several New England cities, including Hartford, as a measure of the value of the parking space available on top of the conduit. Information was received from State and municipal authorities and private operators on rates of return from public metered lots, public lots leased to private operators and privately-owned and operated facilities. The annual rate varied from $.30 a square foot for metered parking in a Boston suburb to $2.00 per square foot for private lots in Boston. In Hartford, the rental rates for both public and private parking are the same and yield a net annual return of $0.70 a square foot. While the projected increase in population and economic activity noted in Appendix C, Economic Development would indicate a higher rate of return in the future, the present value was adopted as being reasonably assured. There are 160,000 square feet of conduit surface on which parking will be available so the annual benefit to the provision of such parking amounts to $112,000.

The total tangible annual benefits to the recommended project amount to $1,420,000.

| | RANGE "A" 1" = $ 1,600 | | | RANGE "B" 1" = $2,000 | | | RANGE "C" 1" = $ 4,000 | | | TOTAL ANNUAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | AREA | LOSS | BEN. | AREA | LOSS | BEN | AREA | LOSS | BEN | ANN. LOSS | ANN. BEN |
| PRESENT CONDITIONS | 13.85 | 22.160 | — | 9.05 | 18,100 | — | 1.13 | 4,520 | — | $44,780 | — |
| PRESENT COND. MODIFIED | 7.55 | 12,080 | 10,080 | — | — | 18,100 | — | — | 4520 | $ 12,080 | $ 32,700 |
| FUTURE CONDITIONS | 16.65 | 26,640 | — | 13.15 | 26,300 | — | 1.65 | 6,600 | — | $ 59,540 | — |
| FUTURE COND. MODIFIED | 7.55 | 12,080 | 14,560 | — | — | 26,300 | — | — | 6600 | $ 12,080 | $ 47,460 |




DAMAGE-FREQUENCY CURVE
PARK RIVER BASIN
HARTFORD, CONN.
1966 PRICE LEVEL

PLATE D-1

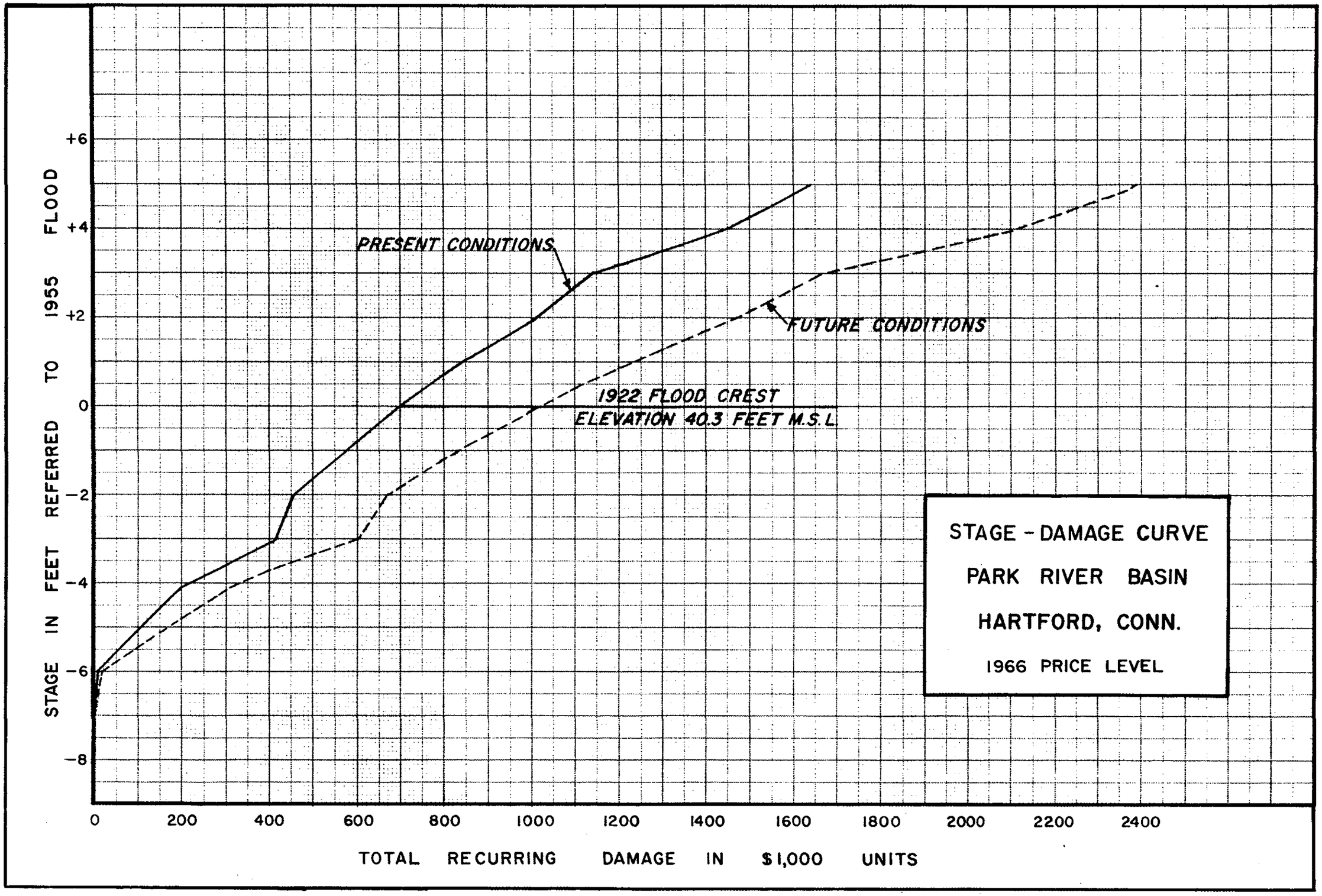

PRESENT CONDITIONS
FUTURE CONDITIONS
1922 FLOOD CREST
ELEVATION 40.3 FEET M.S.L.
STAGE - DAMAGE CURVE
PARK RIVER BASIN
HARTFORD, CONN.
1966 PRICE LEVEL
STAGE IN FEET REFERRED TO 1955 FLOOD
+6
+4
+2
0
-2
-4
-6
-8
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
TOTAL RECURRING DAMAGE IN $1,000 UNITS

PLATE D-2

# APPENDIX E

# PROJECT DESCRIPTION AND COST ESTIMATES

APPENDIX E

PROJECT DESCRIPTION AND COST ESTIMATES

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APPENDIX E

PROJECT DESCRIPTION AND COST ESTIMATES

## INTRODUCTION

### 1. PURPOSE

The design features and cost estimates of the recommended modification of the existing flood control project for Hartford, Connecticut, consisting of five sections of conduit, junction structure, a pumping station, an auxiliary conduit, and a headwall, are presented in this Appendix. The principal features are shown on Plates E-1 through E-5.

## DESIGN CRITERIA

### 2. HYDRAULIC

a. Existing Park River conduit. The existing Park River conduit was designed to discharge 18,000 c.f.s. into the Connecticut River with the river stage at elevation 26.0 feet m.s.l. (mean sea level) and the conduit headwaters at elevation 44.0 feet, m.s.l. The conduit is two-barrelled in cross section with inside dimensions of each barrel 30 feet wide by 19 feet 6 inches high. Under design conditions which produce a maximum flow, the conduit will be totally submerged and no significant changes in velocity will occur except beyond the outlet where a rock apron prevents scour in the bed of the Connecticut River.

At moderate rates of flow and, under certain conditions, a hydraulic jump will occur within the conduit. The probability of conditions developing to produce a jump of troublesome magnitude is considered extremely remote. In the event that such conditions do develop, however, the jump could possibly undulate and cause vibrations in the structure if the water surface comes into contact with the roof. However, the structure was considered to be sufficiently massive and structurally sound so as not to be damaged by this infrequent occurrence.

b. Conduit extensions. The extensions to the existing Park River conduit which either have been completed or are presently under construction were designed by an engineering firm engaged by the Greater Hartford Flood Commission. Sections 1 and 3 on the Park River are sized to pass a flow of 18,000 c.f.s.; sections

6 and 8 are designed for flows of 22,000 c.f.s. and 10,000 c.f.s. respectively.

Proposed sections 2, 4, 5, and 7 are sized to flow full with the occurrence of a standard project flood.

c. Auxiliary conduit. The auxiliary conduit was designed to flow full throughout its length with the occurrence of a standard project flood.

3. STRUCTURAL

a. Existing Park River conduit. The existing Park River conduit, together with the inlet and outlet structures, was designed to withstand the most severe loadings and combinations of loadings. Provisions were made for tying into the conduit such appurtenances as the Bushnell Park pumping station and the Gully Brook conduit. The conduit was designed to withstand a pressure from a gradient of 48.0 feet, m.s.l. at the entrance in Bushnell Park with the Connecticut River at 26 feet, m.s.l.

b. Conduit extensions. The structural design criteria and computations, for those sections of the Park River conduit extension which were designed for construction in conjunction with segments of Interstate Route 84, were reviewed by the New England Division of the Corps of Engineers to insure conformity with the criteria contained in the pertinent Engineering Manuals, copies of which had previously been furnished the design engineers.

The two sections of conduit between the junction structure and the existing Park River conduit were designed to withstand internal pressures which would be produced by a pressure gradient 9 feet above its crown.

The South Branch conduit and the North Branch conduit, which are being built by the Connecticut Highway Department were designed to withstand internal pressures which would result from a pressure gradient of 10 feet above the crown.

Proposed sections 2, 4, 5, and 7 will be designed to be compatible with adjacent sections 1, 3, 6, and 8.

c. Auxiliary conduit. The rock tunnel section of the auxiliary conduit will have a minimum lining thickness of 2'-0". Quantities are based on a payment line 9" outside the line of minimum thickness. Provisions have been made for steel support and rock bolts in areas of inadequate rock. Tunneling in earth will require support steel and liner plate throughout. Sections constructed in open cut will be of reinforced concrete.

## 4. CONDUIT EXTENSION SECTIONS COMPLETED OR UNDER CONSTRUCTION

The Connecticut Highway Department has completed two sections of conduit extension on the Park River (designated as conduit extension sections 1 and 3 and shown on Plate E-1) totaling 2,923 feet in length. A section of conduit on the North Branch, 2,760 feet in length (conduit extension section 8), and a section of the South Branch (section 6), 1,460 feet in length, are now under construction. In addition, 1,451 feet of paved channel just upstream of conduit extension section 6 is also under construction. The sizes of conduit extension sections completed or under construction are shown on Plate E-2.

The sections of conduit extension completed or under construction and the South Branch approach channel were designed by an engineering firm engaged by the Greater Hartford Flood Commission and coordinated with I-84 highway plans. Construction contracts for the sections of conduit and the highway are being administered by the Connecticut Highway Department. These sections have been designed to be adequate for use as pressure conduits.

Based on an agreement between the Connecticut Highway Department and the Greater Hartford Flood Commission, the Commission will pay approximately $12,740,000 for conduit construction with funds furnished by the city of Hartford.

## SELECTED PLAN OF PROTECTION

## 5. DESCRIPTION OF PLAN

a. General. The selected plan of improvement consists of filling in the 'gaps' in the conduit extension by the construction of four sections of conduit (sections 2, 4, 5 and 7), a junction structure, an auxiliary conduit, a pumping station, drainage facilities, and a headwall at the entrance to the North Branch conduit extension.

Construction of the four sections of conduit will require the removal of three highway bridges and one foot bridge, and removal and relocation of existing sanitary sewers, water lines, and utilities.

b. Conduit sections 2 and 4. Conduit sections 2 and 4 will be two-barrelled reinforced concrete structures 1,232 feet and 1,337 feet in length, respectively. Each barrel will be 34 feet wide and 26.5 feet high. Design will be comparable to existing sections 1 and 3 with allowances for variations in foundation

conditions and anticipated loading.

Conduit section 2 will be founded on bedrock throughout its length. Construction will require removal of Broad Street and Flower Street bridges and factory buildings on the right bank of the river, relocation of sanitary sewerage facilities and utilities, and the construction of drainage pipes and facilities to dispose of high-level and low-level drainage which now discharges to the river.

Section 4 will be founded on earth throughout most of its length. Construction will include lateral drainage pipes and facilities to conduct low-level drainage to a pumping station to be constructed on the right bank of the Park River near Riverside Street. Lateral drainage pipes will be connected to existing pipes which parallel conduit section 3.

c. Conduit section 5. Conduit section 5 will be entirely on earth and will require bearing pile foundation. It will be a twin-barrelled reinforced concrete structure 103 feet in length. Each barrel will be 36 feet wide and 27.5 feet high. Design will be comparable with section 6.

d. Conduit section 7. Conduit section 7 will be entirely on earth and will require bearing pile foundation. It will be a twin-barrelled reinforced concrete structure, 1,044 feet in length. Each barrel will be 22 feet wide and 25 feet high. Design will be comparable with conduit section 8, now under construction, with allowances for differences in foundation conditions and anticipated loading.

Conduit section 7 includes drainage pipes and facilities to conduct low-level drainage to the proposed pumping station to be located on the right bank of the Park River. Construction will require the removal of the Laurel Street bridge.

e. Auxiliary conduit. The auxiliary conduit will be a 22-foot inside diameter, circular cross-section structure extending from the junction structure 9,100 feet to the Connecticut River.

From the junction structure to a point in Pope Park northeast of the intersection of Park Terrace and Park Street, a length of 300 feet, construction will be in open cut. Thence it will be by tunneling in earth and rock, a length of 6,200 feet, following Park Street and private property to a point on Wyllys Street near Lisbon Street. From this point, construction will be in open cut again in Wyllys Street and Charter Oaks Avenue to a point near Sheldon Street, a length of 1,700 feet. For 800 feet, under a

portion of Van Dyke Avenue, Highway I-91, and the Corps of Engineers Connecticut River floodwall, the conduit will be constructed by tunneling in earth. The remaining 100 feet to an outlet structure at the Connecticut River will be constructed in open cut.

f. Junction structure. The junction structure will be a reinforced concrete structure resting entirely on earth and will require bearing pile foundation. Flows from the North Branch and South Branch will be combined at the junction structure and discharged to the Park River conduit extension and to the auxiliary conduit.

g. Pumping station. A pumping station will be located on the right bank of the Park River downstream of the junction structure to pump low-level drainage to the conduit extension during flood periods. It will be equipped with 3 vertical volute pumps driven by diesel engines to discharge 250 c.f.s. against a 30-foot head.

h. North Branch headwall. The section of North Branch conduit extension now under construction by the Connecticut Highway Department (section 8b) will include a headwall and grading to high ground at 54.5 feet, m.s.l. At the entrance to the North Branch (conduit section 8), the contract calls for low steel sheet piling walls tying in to the Farmington Avenue Bridge, in anticipation of further extension of the conduit as a part of this project. It has been found that further extension cannot be justified. Therefore, a reinforced concrete headwall will be constructed at the entrance to the North Branch conduit extension with a top elevation of 54.5 feet, m.s.l., similar to the South Branch headwall. The design headpools at 52 feet, m.s.l. will be contained with a 2.5-foot freeboard.

## 6. SITE GEOLOGY AND FOUNDATION CONDITIONS

The overburden throughout the area consists of glacial lake deposits composed mainly of varved and stratified silt, clay and sand which are underlain by till. Locally the lake deposits thin out or are missing and the till, consisting of variable, silty, gravelly sand and sandy, silty gravel with numerous cobbles and boulders, occurs at the ground surface. In some areas the river flows on a cobble and boulder pavement and elsewhere on recent alluvium composed of sands, gravels, muck and, locally, peat. Artificial fills consisting of silt, sand, gravel, boulders, cinders, and trash occur in several areas. Bedrock outcrops locally along the conduit extension, particularly in section 2, but is buried to

various depths in the ridge through which the tunnel for the auxiliary conduit is proposed. The bedrock consists of conglomerate, sandstone, shale, and "trap" rock. A more detailed discussion of the geology of the area is presented in Appendix F.

7. AVAILABILITY OF CONSTRUCTION MATERIALS

Random fill, pervious fill, and gravel are available from commercial sources within five miles of the site. Trap rock quarries in Newington and sand deposits in Glastonbury are sources of concrete aggregate for conduit sections now under construction and will be acceptable for future construction.

8. LANDS AND DAMAGES

The sections of conduit extension being proposed in the report which are required to complete the conduit extension will, to a large extent, fall within the banks of the Park River and the North Branch of the Park River. No value has been placed on river areas. The auxiliary conduit will be constructed principally within street rights-of-way. Where the conduit passes under private property, permanent easements will be secured. Local interests will be required to provide spoil areas. No cost is included for such areas because, in areas directly inside the existing dikes and in a number of other areas, development requires fill. It is anticipated that, at the time of construction, fill will be in demand and surplus material from project construction may be sold.

A detailed breakdown of lands and damages is given in Table E-1.

9. RELOCATIONS

Construction of conduit to "fill in the gaps" will require removal of three highway bridges. Upon completion of the conduit, the highway pavement, sidewalls, drains, and other appurtenances will be replaced by local interests at their expense. At a number of locations, the drains, sewers, and utilities will require relocation outside the area required for construction of the conduits.

10. PLAN OF CONSTRUCTION

It is anticipated that the recommended plan will require about three years to complete. The physical limitation of the site and the urban nature of the general area are important factors bearing on the progress that may be expected.

The handling of river flows and the maintenance of traffic and

services at all times will govern the scheduling of the major items of construction and the methods of construction.

The proposed sections of conduit extension will be constructed one barrel at a time to allow for river diversion. Only one of the four highway bridges to be removed should be out of service at a time. The lower open cut section of the auxiliary conduit will be constructed in such a manner as to minimize the interference with highway traffic crossing the construction site and access to adjacent properties.

## BASIS FOR FIRST AND ANNUAL COSTS

### 11. BASIS OF COST ESTIMATES

Topographic maps of the U. S. Geological Survey to a scale of 1:31,600 and 1:24,000, with 10-foot contours; and photogrammetric maps of the Commission on Regional Planning, the Metropolitan District, Hartford County, Connecticut, to a scale of 1" = 200' with 2-foot contours were supplemented by available field survey information previously obtained by other interests. Foundation conditions for the conduit extension were determined by field reconnaissance and by an examination of the logs of borings which have been made in the vicinity of the proposed structures by the state Highway Department and the Greater Hartford Flood Commission in connection with highway and conduit construction in the area. Principal construction items were estimated on the basis of a preliminary design, the plans, sections, and details of which are shown on Plates E-1 through E-5.

### 12. UNIT PRICES

Unit prices at a 1966 price level, are based on averages for the construction of comparable conduit projects in the Greater Hartford area.

### 13. CONTINGENCIES, ENGINEERING AND OVERHEAD

The construction and relocation cost estimates have been increased 20 percent to cover contingencies. Costs of engineering and design, supervision and administration, are estimated lump sums based on experience, evaluation of the site and project, and comparison with similar projects in the area.

## FIRST COSTS AND ANNUAL COSTS

### 14. FIRST COSTS

The total estimated cost of the project is $31,100,000. Local interests will provide all lands, easements, and rights-of-way and accomplish relocations made necessary by the construction. Detailed estimates by principal project feature are given in Table E-1.

### 15. ANNUAL COSTS

The estimated annual cost of the proposed improvement is $1,130,000. The determination of annual costs is shown in Table E-2.

TABLE E-1

ESTIMATED FIRST COST
PARK RIVER FLOOD CONTROL
Hartford, Conn.

SUMMARY

| | |
|---|---|
| **Non-Federal** | |
| Lands & Damages | $ 630,000 |
| Relocations | 170,000 |
| | 800,000 |
| **Federal** | |
| Conduit Extension | $ 9,400,000 |
| Auxiliary Conduit | 16,360,000 |
| Pumping Station | 480,000 |
| Engineering & Design | 2,090,000 |
| Supervision & Administration | 1,970,000 |
| Total Federal First Costs | 30,300,000 |
| TOTAL FIRST COST | 31,100,000 |

TABLE E-1 (cont'd)

LANDS AND DAMAGES

| Item | Estimated Quantity | Unit | Unit Price | Amount |
|---|---|---|---|---|
| Land - Fee | | | | |
| Commerical | 2,000 | s.f. | 3.00 | $ 6,000 |
| Industrial | 28,000 | s.f. | 1.00 | 28,000 |
| Parkland | 40,000 | s.f. | .50 | 20,000 |
| Residential | 36,000 | s.f. | .50 | 18,000 |
| Land - Permanent Easement | | | | |
| Industrial | 26,000 | s.f. | 1.00 | 26,000 |
| Park Land | 40,000 | s.f. | .50 | 20,000 |
| Residential | 36,000 | s.f. | .50 | 18,000 |
| Residential | 80,000 | s.f. | .25 | 20,000 |
| Land - Temporary Easement | | | | |
| Residential | 80,000 | s.f. | .15 | 12,000 |
| Improvements | | | | |
| Commercial | 1 | job | L.S. | 40,000 |
| Industrial | 1 | job | L.S. | 90,000 |
| Residential | 2 | job | L.S. | 30,000 |
| Severence damage | | | | 160,000 |
| Administrative cost | | | | 5,000 |
| | | | | 493,000 |
| Contingencies | | | | 57,000 |
| | | | | 550,000 |
| Acquisition costs | | | | 80,000 |
| TOTAL COST - LANDS AND DAMAGES | | | | $630,000 |

TABLE E-1 (cont'd)

RELOCATIONS

| Item | Estimated Quantity | Unit | Unit Price | Amount |
|---|---|---|---|---|
| Replacement of | | | | |
| a. Broad Street | 1 | job | L.S. | $ 25,000 |
| b. Flowers Street | 1 | job | L.S. | 25,000 |
| c. Laurel Street | 1 | job | L.S. | 20,000 |
| Relocation of sewers, drains and utilities | 1 | job | L.S. | 50,000 |
| | | | | 120,000 |
| Contingencies | | | | 25,000 |
| | | | | 145,000 |
| Engineering & Design | | | | 13,000 |
| Supervision & Administration | | | | 12,000 |
| TOTAL - RELOCATIONS | | | | $170,000 |

CONDUIT EXTENSION
(Sect. 2, 4, 5, 7 Junction Structure and No. Branch H'wall)

| Description | Estimated Quantity | Unit | Unit Price | Estimated Amount |
|---|---|---|---|---|
| Preparation of site | 1 | job | L.S. | $ 10,000 |
| Clearing and Grubbing | 1 | job | L.S. | 3,000 |
| Control of River | 1 | job | L.S. | 300,000 |
| Underpinning & protec. of existing structures | 1 | job | L.S. | 75,000 |
| Maintenance & control of traffic | 1 | job | L.S. | 35,000 |
| Removal of buildings | 1 | job | L.S. | 20,000 |
| Removal of bridges | 1 | job | L.S. | 17,000 |
| Excavation | | | | |
| Earth, structure | 148,000 | c.y. | $2.00 | 296,000 |
| Rock, structure | 43,000 | c.y. | 5.00 | 215,000 |
| Rock, trench | 1,800 | c.y. | 10.00 | 18,000 |
| Borrow | | | | |
| Random | 27,000 | c.y. | 1.00 | 27,000 |
| Pervious | 120,000 | c.y. | 1.75 | 210,000 |
| Gravel | 12,000 | c.y. | 2.00 | 24,000 |
| Broken Stone | 8,000 | c.y. | 3.00 | 24,000 |

TABLE E-1 (cont'd)

CONDUIT EXTENSION (cont'd)

| Description | Estimated Quantity | Unit | Unit Price | Estimated Amount |
|---|---|---|---|---|
| Placing | | | | |
| Random fill | 60,000 | c.y. | .50 | 30,000 |
| Broken Stone | 8,000 | c.y. | 1.00 | 8,000 |
| Gravel | 10,000 | c.y. | .50 | 5,000 |
| Pervious backfill | 98,000 | c.y. | 1.00 | 98,000 |
| Conduit | | | | |
| Reinforced concrete | 63,000 | c.y. | 80.00 | 5,040,000 |
| Access manholes | 6 | ea. | 1,500.00 | 9,000 |
| Furnishing & driving piles | 56,000 | l.f. | 11.50 | 644,000 |
| Side drains | 8,000 | l.f. | 6.00 | 48,000 |
| Drain chambers | 14 | ea. | 4,500.00 | 63,000 |
| Reinforced concrete pipe | | | | |
| 12" | 1,000 | l.f. | 4.00 | 4,000 |
| 15" | 1,200 | l.f. | 5.00 | 6,000 |
| 18" | 450 | l.f. | 6.00 | 2,700 |
| 21" | 400 | l.f. | 7.50 | 3,000 |
| 24" | 500 | l.f. | 8.00 | 4,000 |
| 27" | 40 | l.f. | 10.00 | 400 |
| 30" | 400 | l.f. | 15.00 | 6,000 |
| 36" | 1,400 | l.f. | 18.00 | 25,200 |
| 42" | 400 | l.f. | 20.00 | 8,000 |
| 48" | 450 | l.f. | 24.00 | 10,800 |
| 72" | 1,300 | l.f. | 65.00 | 84,500 |
| 84" | 1,000 | l.f. | 70.00 | 70,000 |
| Reinforced concrete pipe (Lock Joint) | | | | |
| 36" | 500 | l.f. | 20.00 | 10,000 |
| 42" | 150 | l.f. | 22.00 | 3,300 |
| 48" | 800 | l.f. | 24.00 | 19,200 |
| Manholes, pressure | 16 | ea. | 1,800 | 28,800 |
| Manholes, concrete | 12 | ea. | 1,000 | 12,000 |
| Manholes, brick | 14 | ea. | 400 | 5,600 |
| Catch basins | 22 | ea. | 400 | 8,800 |
| Storm, siphon - Willow St. | 1 | job | L.S. | 50,000 |
| Storm, siphon - Pump Sta. | 1 | job | L.S. | 75,000 |

TABLE E-1 (cont'd)

CONDUIT EXTENSION (cont'd)

| Description | Estimated Quantity | Unit | Unit Price | Estimated Amount |
|---|---|---|---|---|
| Storm, siphon - W. of Flower St. | 1 | job | L.S. | $ 6,000 |
| Sanitary siphon, So. Woodbine St. | 1 | job | L.S. | 10,000 |
| Sanitary siphon, Armory | 1 | job | L.S. | 30,000 |
| Reinforced concrete North Branch Headwall | 1,000 | c.y. | 80.00 | 80,000 |
| Seeded topsoil | 25,000 | s.y. | 1.00 | 25,000 |
| Removal and replacement of utilities | 1 | job | L.S. | 25,000 |
| | | | | 7,832,300 |
| Contingencies | | | | 1,567,700 |
| | | | | 9,400,000 |
| Engineering & Design | | | | 750,000 |
| Supervision & Administration | | | | 700,000 |
| | | | | $10,850,000 |

AUXILIARY CONDUIT

| | | | | |
|---|---|---|---|---|
| Preparation of site | 1 | job | L.S. | $ 10,000 |
| Maint. & control of traffic | 1 | job | L.S. | 50,000 |
| Control of water | 1 | job | L.S. | 100,000 |
| Underpinning & prot. of bldgs. | 1 | job | L.S. | 50,000 |
| Removal of bldgs. | 1 | job | L.S. | 5,000 |
| Earth excavation, common | 5,000 | c.y. | 1.00 | 5,000 |
| Earth excavation, structure | 63,000 | c.y. | 2.00 | 126,000 |
| Earth excavation, tunnel | 28,000 | c.y. | 20.00 | 560,000 |
| Rock excavation, struc. | 26,000 | c.y. | 5.00 | 130,000 |
| Rock, tunnel | 145,000 | c.y. | 23.00 | 3,335,000 |
| Borrow | | | | |
| a. Pervious | 28,000 | c.y. | 1.75 | 49,000 |
| b. Gravel | 1,000 | c.y. | 2.00 | 2,000 |
| Placing | | | | |
| a. Random backfill | 24,000 | c.y. | .50 | 12,000 |
| b. Pervious backfill | 26,000 | c.y. | 1.00 | 26,000 |
| c. Gravel | 2,000 | c.y. | .50 | 1,000 |

TABLE E-1 (cont'd)

AUXILIARY CONDUIT (cont'd)

| Description | Estimated Quantity | Unit | Unit Price | Estimated Amount |
|---|---|---|---|---|
| Furnishing and driving steel sheet piling | 100,000 | s.f. | 3.50 | 350,000 |
| Tunnel support steel | | | | |
| a. Tunnel in rock | 4,500,000 | lbs. | .35 | 1,575,000 |
| b. Tunnel in earth | 1,500,000 | lbs. | .35 | 525,000 |
| Rock bolts | 25,000 | l.f. | 5.00 | 125,000 |
| Steel lagging | 40,000 | l.f. | 2.50 | 100,000 |
| Liner plate - tunnel in earth | 1,100,000 | lbs. | .35 | 385,000 |
| Concrete mass | 3,000 | c.y. | 50.00 | 150,000 |
| Concrete, reinforced | | | | |
| a. Tunnel in earth | 9,600 | c.y. | 70.00 | 672,000 |
| b. Conduit in open cut | 20,000 | c.y. | 70.00 | 1,400,000 |
| Concrete, tunnel lining | 60,000 | c.y. | 50.00 | 3,000,000 |
| Grout, tunnel in rock | 1 | job | L.S. | 125,000 |
| Removal and replacement Water lines, Sewer lines, Drainage facilities & Utilities | 1 | job | L.S. | 600,000 |
| Access, manhole | 2 | ea. | 1,500 | 3,000 |
| Replacement of highway Pavement and sidewalks | 1 | job | L.S. | 40,000 |
| Seeded topsoil | 5,000 | s.y. | 1.00 | 5,000 |
| Cofferdam | 1 | job | L.S. | 50,000 |
| | | | | 13,566,000 |
| Contingencies | | | | 2,794,000 |
| | | | | 16,360,000 |
| Engineering & Design | | | | 1,300,000 |
| Supervision & Administration | | | | 1,240,000 |
| TOTAL | | | | $18,900,000 |

TABLE E-1 (cont'd)

PUMPING STATION

| Item | Quantity | Unit Price | Unit | Amount |
|---|---|---|---|---|
| Structure | 1 | job | L.S. | $240,000 |
| Mechanical and Electrical Equipment | 1 | job | L.S. | 160,000 |
| | | | | 400,000 |
| Contingencies | | | | 80,000 |
| | | | | 480,000 |
| Engineering & Design | | | | 40,000 |
| Supervision & Administration | | | | 30,000 |
| TOTAL - PUMPING STATION | | | | $550,000 |

TABLE E-2

ESTIMATED ANNUAL COSTS
PARK RIVER FLOOD CONTROL
Hartford, Conn.

| | |
|---|---|
| **Federal Investment** | |
| First Cost | $30,300,000 |
| Interest during construction | 1,400,000 |
| Total Federal Investment | 31,700,000 |
| **Federal Annual Costs** | |
| Interest on Investment | 989,000 |
| Amortization | 48,000 |
| Federal Annual Costs | 1,037,000 |
| **Non-Federal Investment** | |
| First Cost | 800,000 |
| Interest during construction | 38,000 |
| Total Non-Federal Investment | 838,000 |
| **Non-Federal Annual Costs** | |
| Interest on Investment | 27,000 |
| Amortization | 1,000 |
| Major replacements | 15,000 |
| Maintenance and operation | 50,000 |
| Non-Federal Annual Costs | 93,000 |
| TOTAL ANNUAL COST | $ 1,130,000 |

$12,740,000 Condl Estimate
Annual Cost (No Int During Const)
100
I & A 417,000
Major Repl 5,000
O & M 25,000
447,000

447
1130
1577



1,420,000 / 1,577,000 = .90 to 1.0

## OTHER PLANS CONSIDERED

### 16. GENERAL

Consideration was given to upstream reservoir storage and diversion in lieu of auxiliary conduit capacity. Further extension of the North Branch conduit as requested by local interests was also considered.

The presence of recent housing, highway, and commercial developments in the basin, as well as established communities along the main streams, makes the construction of large impoundments economically infeasible. Impoundments throughout the basin in the future will be less favorable due to continued growth and development. The eight reservoirs in the Soil Conservation Service plans were derived as the maximum reservoir development on the basis of studies inclusive of review of previous studies by others.

The Greater Hartford Flood Commission, after the 1955 record flood, engaged engineering firms to study the problem and propose solutions. Many alternative reservoirs and reservoir systems in the headwaters and channel improvements throughout the basin were considered as supplemental to plans of downstream conduit and auxiliary conduit extension. The Commission also considered the diversion of North and South Branch flows.

The Soil Conservation Service engaged an engineering firm to develop plans for the North and South Branches. The existing channel program of that agency will be beneficial to low areas along the main stream. The more rapid concentration of flow combined with future development will increase flows at Hartford in a major flood.

Although, in general, few possibilities for additional storage exist in the basin, studies for this report considered all additional potential improvements for flood control in both branches of the Park River.

### 17. STORAGE RESERVOIRS

Three Soil Conservation Service detention reservoirs in the North Branch watershed have been completed and one, under contract, is scheduled for completion in 1966. The four reservoirs have a combined storage capacity of 4,400 acre-feet and will cost a total of about $4,070,000. Over 80 percent of the cost is for land acquisition. In selecting these four reservoirs, ten other sites were studied and eliminated. The most favorable of the sites

studied and eliminated was a dam and reservoir on Tumbledown Brook. The reservoir would store 1,700 acre-feet from a 3.8 square mile drainage area and would cost an estimated $3,000,000. The site was eliminated principally because of strong local opposition to land acquisition involved. It is anticipated that the local objection to development of this site would be encountered in the future also. Development of other, smaller sites would be less favorable. Larger sites on the South Branch would involve thickly settled areas.

Two Soil Conservation Service detention reservoirs in the South Branch watershed have been completed; a third, under contract, is scheduled for completion in 1966; a fourth, soon to be placed under contract, is scheduled for completion in 1967. The combined capacity of the reservoirs will be 2,470 acre-feet and the cost will total just under $2,000,000 with about 74 percent of the cost for land acquistion. The maintenance of Deadwood Swamp in its present state has cost $64,000 for flowage rights.

A total of thirteen sites in the South Branch watershed were studied by the Soil Conservation Service. Eight of the thirteen sites were found to be not economically justified because of recent development of high value properties and the alignment of existing and proposed interstate highways and access roads in reservoir or structure areas. One site, Deadwood Swamp, was not developed due to its effectiveness under natural conditions.

A field and office review of previously considered sites was made. One reservoir plan, considered in early studies by the Greater Hartford Flood Commission and later studied and eliminated by the Soil Conservation Service, appeared to be the most favorable of the plans not developed. It would consist of two reservoirs in the Piper Brook watershed and overflow to Wood Pond in the Trout Brook watershed. At the time of the original study, the plan would have provided 3,300 acre-feet of storage from a drainage area of 9.7 square miles. However, an interstate highway, now under design, will pass through the storage area reducing the storage to about 2,300 acre-feet. The plan would cost an estimated $10,000,000.

The most favorable North and South Branch reservoirs, with a combined storage capacity of 4,000 acre-feet, would not eliminate the need for an auxiliary conduit. In a standard project flood, without an auxiliary conduit, the headpools at the North and South Branch conduit extension entrances would rise to elevation 55 feet m.s.l., or three feet above the design elevation of 52.0 feet, m.s.l. It is estimated that provision of the total storage required would

exceed the cost of the auxiliary conduit. Therefore, no further consideration was given to reservoir storage.

18. DIVERSION

Diversion of North Branch flood flows to the Connecticut River either through Windsor or Hartford would require construction through an urban area. The total length of the diversion and the cost would be greater than for an auxiliary conduit downstream.

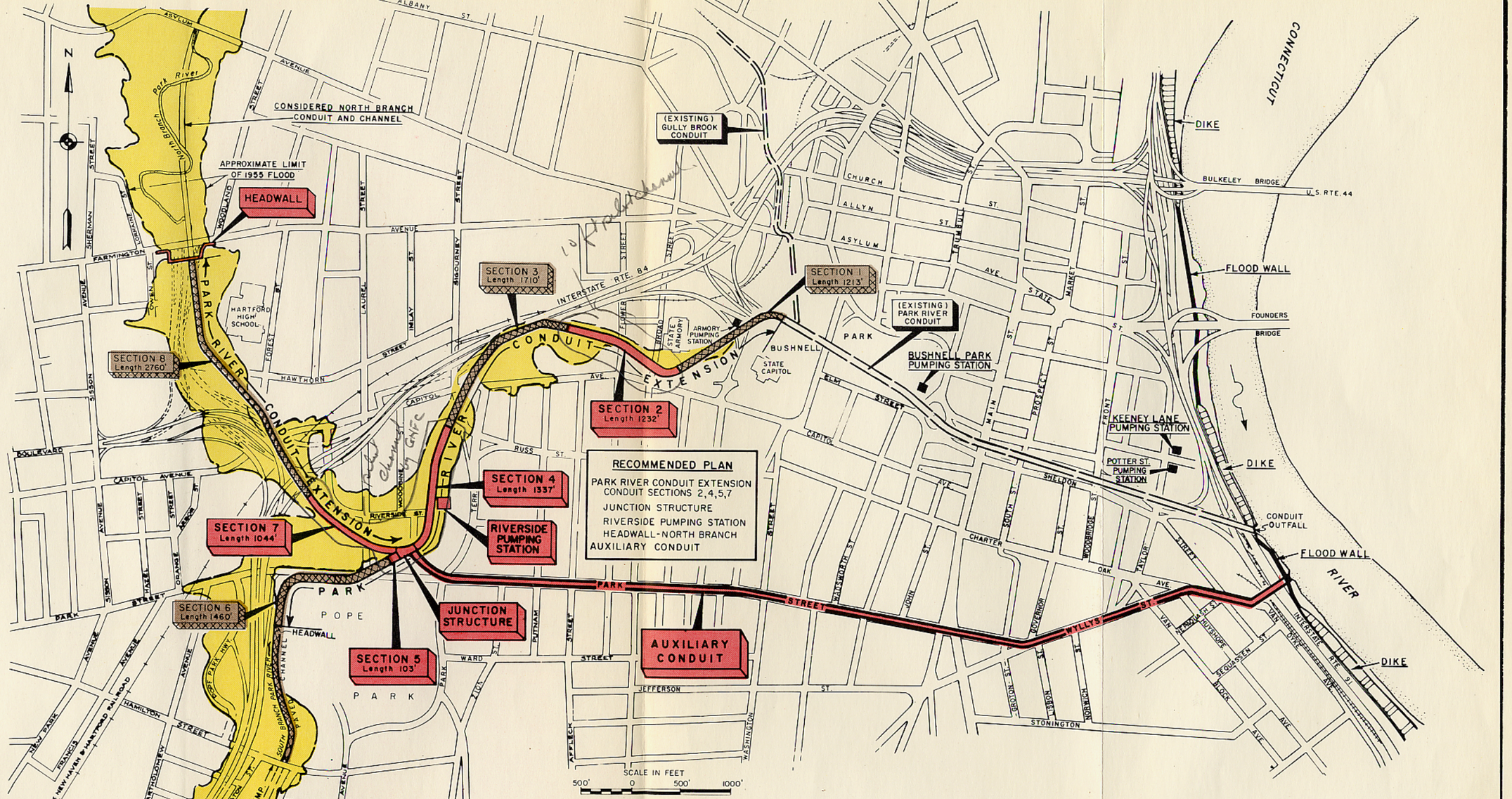
The Greater Hartford Flood Commission in an early study considered diversion of Piper Brook flood runoff to the Mattabesset River by way of Webster Brook. A field and office review of the plan indicated a cost of over $10,000,000. About 22,000 feet of channel improvement, rebuilding of four bridges on Webster Brook, and three on the Mattabesset River, and construction of a diversion structure and dikes and walls at several locations would be the major items of cost. During a major storm, the Mattabesset River would be at flood stage and diversion of Park River runoff would be a liability. The plan would be less effective than increasing downstream conduit capacity by construction of an auxiliary conduit in the Park River basin. Consideration was also given to diversion of South Branch flood runoff to Wethersfield Cove from the confluence of Mill and Piper Brook. The three miles of conduit and diversion structure required would be more costly than the downstream auxiliary conduit. Diversion of flood flows therefore was found not to merit further study.

19. NORTH BRANCH CONDUIT EXTENSION

Consideration was given to further extension of the North Branch conduit 1,000 feet upstream as requested by local interests. It would involve costly relocations and conduit construction at a total estimated cost of about $5,000,000, which would not be justified by the benefits to be realized.

CORPS OF ENGINEERS

U. S. ARMY




LEGEND:

- Approximate Limit of 1955 Flood
- Corps of Engineers, Recommended Plan
- Connecticut Highway Department, Completed or Under Construction.

| REVISION | DATE | DESCRIPTION | BY |
|---|---|---|---|

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

| DR. BY | TR. BY | CK. BY |
|---|---|---|
| J.W.D. | G.H.D. | J.M.L. |

PROJECT ENGINEER

SUBMITTED BY
CHIEF, PLANS & RPTS BRANCH

CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER CONDUIT EXTENSION
AND AUXILIARY CONDUIT
GENERAL PLAN
PARK RIVER, CONNECTICUT

APPROVED
CHIEF ENGINEERING DIV.

DATE JULY 1966

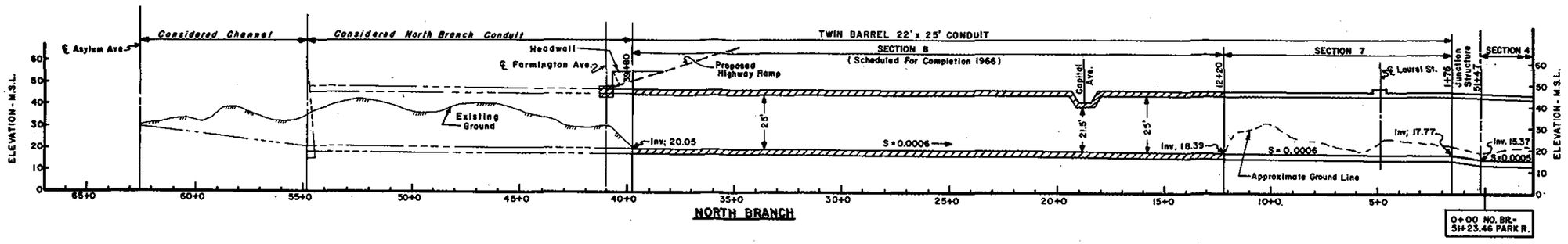
TO ACCOMPANY REPORT
DATED 21 JULY 1966

SCALE: AS SHOWN

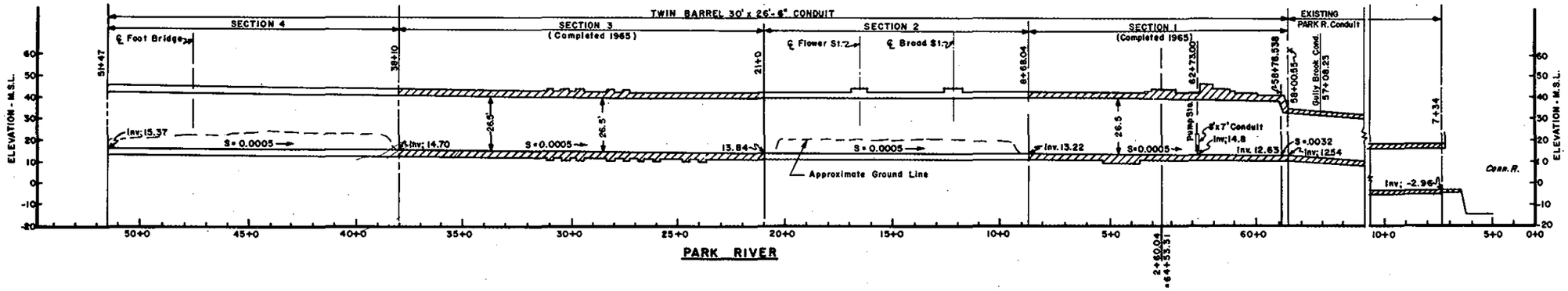
DRAWING NUMBER

SHEET 1 OF 5

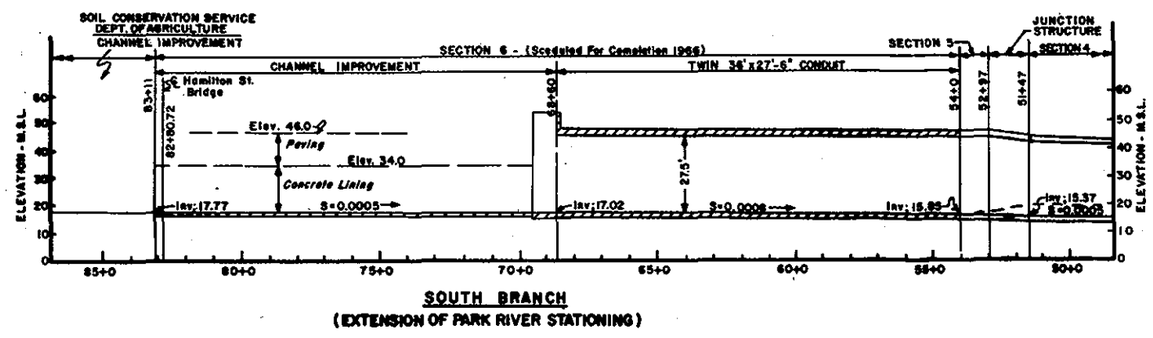
PLATE F-1




NORTH BRANCH




PARK RIVER




SOUTH BRANCH
(EXTENSION OF PARK RIVER STATIONING)

| DIVISION | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

| DR. BY | TC. BY. | DE. BY |
|---|---|---|
| J.W.D. | G.H.D | J.M.L. |

CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER CONDUIT EXTENSION
PROFILES
PARK RIVER, CONNECTICUT

SUBMITTED BY — CHIEF, ENGINEERING DIVISION
APPROVED — DATE: JULY 1966

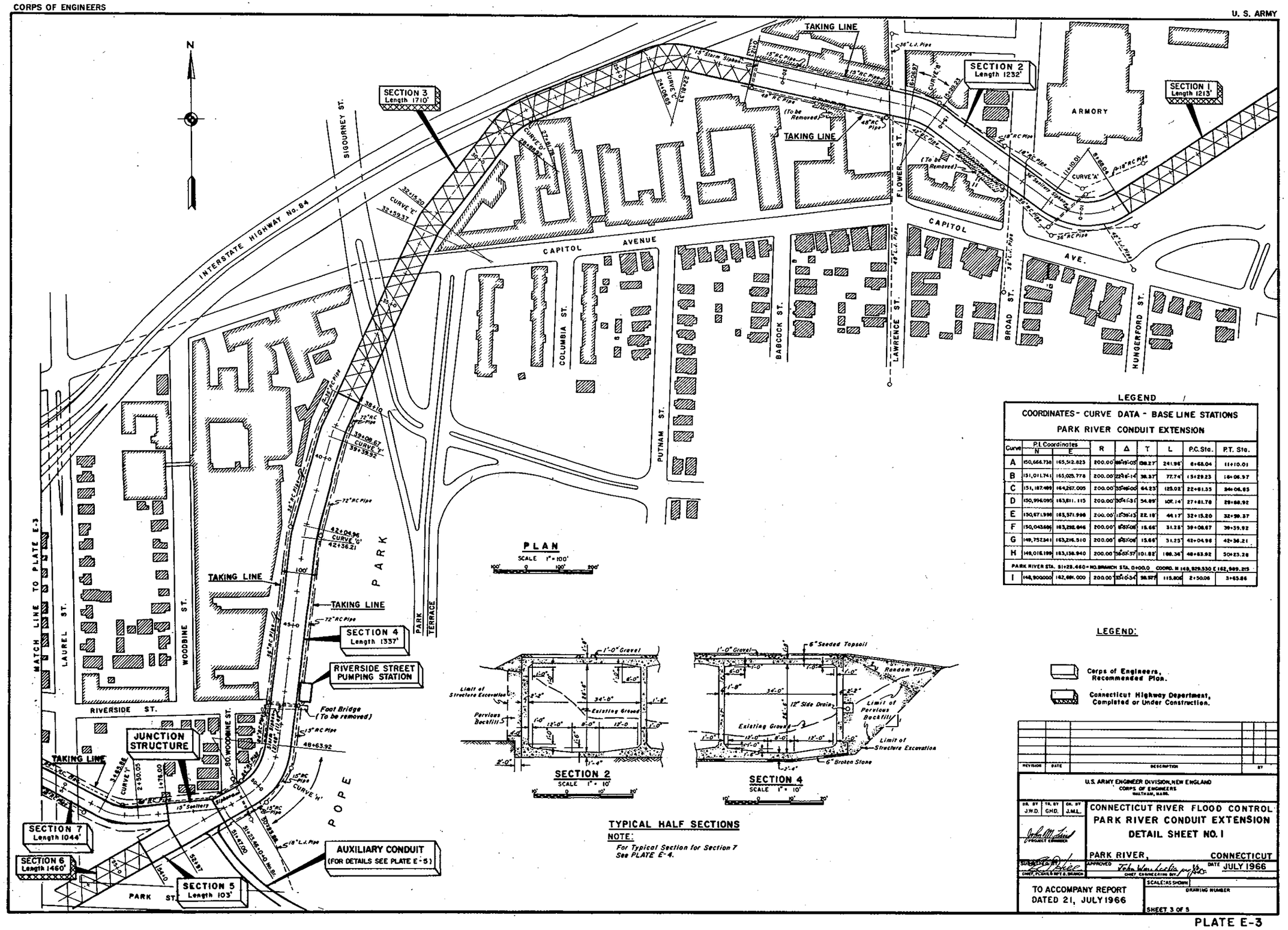
TO ACCOMPANY REPORT
DATED 21 JULY 1966

SCALE
DRAWING NUMBER
SHEET 2 OF 5

PLATE E-2

CORPS OF ENGINEERS

U. S. ARMY




PLAN
SCALE 1" = 100'

SECTION 2
SCALE 1" = 10'

SECTION 4
SCALE 1" = 10'

TYPICAL HALF SECTIONS

NOTE:
*For Typical Section for Section 7 See PLATE E-4.*

LEGEND

COORDINATES - CURVE DATA - BASE LINE STATIONS
PARK RIVER CONDUIT EXTENSION

| Curve | P.I. Coordinates N | P.I. Coordinates E | R | Δ | T | L | P.C. Sta. | P.T. Sta. |
|---|---|---|---|---|---|---|---|---|
| A | 150,666.738 | 165,542.823 | 200.00' | 69°19'-05" | 138.27' | 241.96' | 8+68.04 | 11+10.01 |
| B | 151,011.741 | 165,025.778 | 200.00' | 22°16'-14" | 39.37' | 77.74' | 15+29.23 | 16+06.97 |
| C | 151,187.499 | 164,267.005 | 200.00' | 35°48'-00" | 64.23' | 125.02' | 22+81.35 | 24+06.85 |
| D | 150,996.095 | 163,811.115 | 200.00' | 30°41'-31" | 54.89' | 107.14' | 27+81.78 | 28+88.92 |
| E | 150,671.996 | 163,571.996 | 200.00' | 12°39'-13" | 22.18' | 44.17' | 32+15.20 | 32+59.37 |
| F | 150,043.686 | 163,232.646 | 200.00' | 9°37'-08" | 15.66' | 31.25' | 39+08.67 | 39+39.92 |
| G | 149,752.341 | 163,216.510 | 200.00' | 9°37'-08" | 15.66' | 31.25' | 42+04.96 | 42+36.21 |
| H | 149,015.199 | 163,136.940 | 200.00' | 29°01'-57" | 101.82' | 188.36' | 48+63.92 | 50+23.28 |
| PARK RIVER STA. 51+28.460 = NO. BRANCH STA. 0+00.0 COORD. N 148,829.330 E 162,989.213 | | | | | | | | |
| I | 148,900.000 | 162,691.000 | 200.00 | 33°0-34" | 58.97' | 115.80' | 2+50.06 | 3+65.86 |

LEGEND:

Corps of Engineers, Recommended Plan.

Connecticut Highway Department, Completed or Under Construction.

| REVISION | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

| DR. BY | TR. BY | CH. BY |
|---|---|---|
| J.W.D. | G.N.D. | J.M.L. |

PROJECT ENGINEER

CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER CONDUIT EXTENSION
DETAIL SHEET NO. 1

PARK RIVER, CONNECTICUT

SUBMITTED BY: CHIEF, PLANS & INVT'S. BRANCH

APPROVED: CHIEF, ENGINEERING BRY.

DATE JULY 1966

TO ACCOMPANY REPORT DATED 21, JULY 1966

SCALE: AS SHOWN

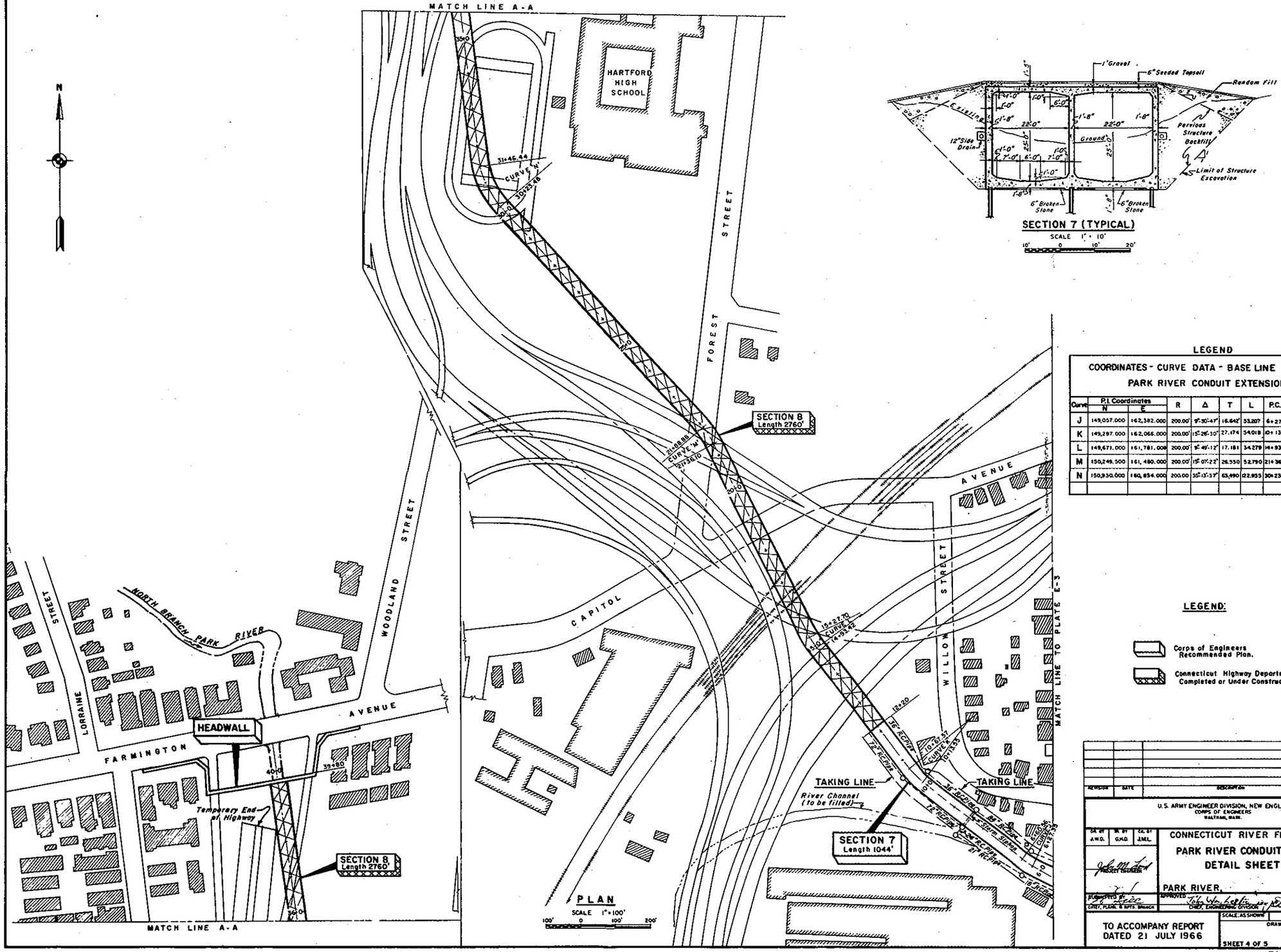
DRAWING NUMBER

SHEET 3 OF 5

PLATE E-3

CORPS OF ENGINEERS

U. S. ARMY







SECTION 7 (TYPICAL)

SCALE 1" = 10'

LEGEND

COORDINATES - CURVE DATA - BASE LINE STATIONS
PARK RIVER CONDUIT EXTENSION

| Curve | P.I. Coordinates N | P.I. Coordinates E | R | Δ | T | L | P.C. Sta. | P.T. Sta. |
|---|---|---|---|---|---|---|---|---|
| J | 149,057.000 | 162,382.000 | 200.00' | 9°-30'-47" | 16.642' | 33.207 | 6+27.350 | 6+60.557 |
| K | 149,297.000 | 162,066.000 | 200.00' | 15°-28'-10" | 27.174 | 54.018 | 10+13.548 | 10+67.566 |
| L | 149,671.000 | 161,781.008 | 200.00' | 9°-49'-12" | 17.181 | 34.279 | 14+93.424 | 15+27.703 |
| M | 150,249.500 | 161,480.000 | 200.00' | 15°-07'-22" | 26.550 | 52.790 | 21+36.093 | 21+88.883 |
| N | 150,930.000 | 160,854.000 | 200.00 | 35°-13'-37" | 63,690 | 122.955 | 30+23.482 | 31+46.438 |

LEGEND:

Corps of Engineers Recommended Plan.

Connecticut Highway Department, Completed or Under Construction.

| REVISION | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

| DR. BY | TR. BY | CK. BY |
|---|---|---|
| A.W.D. | G.M.D. | J.MEL. |

CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER CONDUIT EXTENSION
DETAIL SHEET NO. 2

PARK RIVER, CONNECTICUT

SUBMITTED BY: CHIEF, PLANS & SPTS. BRANCH

APPROVED: CHIEF, ENGINEERING DIVISION

DATE: JULY 1966

TO ACCOMPANY REPORT DATED 21 JULY 1966

SCALE: AS SHOWN

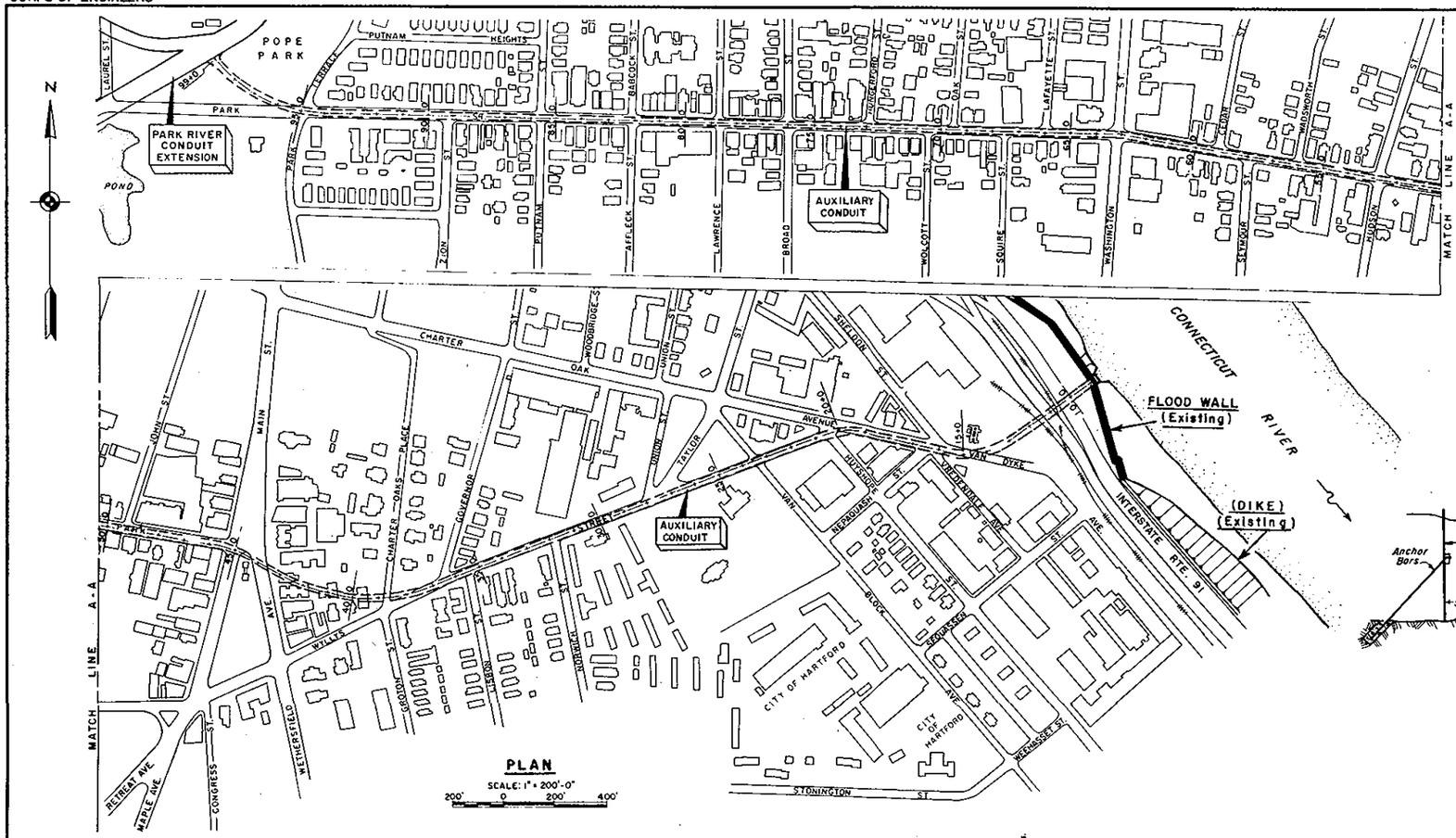
DRAWING NUMBER

SHEET 4 OF 5

PLATE E-4

CORPS OF ENGINEERS

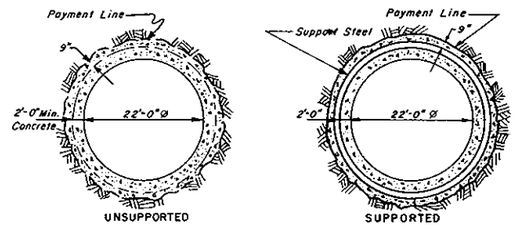
U. S. ARMY



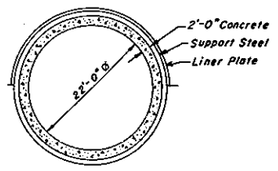

PLAN

SCALE: 1" = 200'-0"

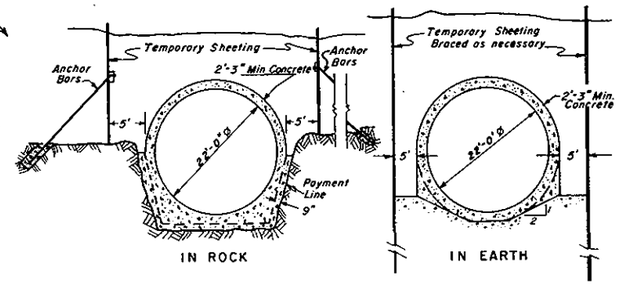
200' 0 200' 400'




TUNNEL IN ROCK




TUNNEL IN EARTH

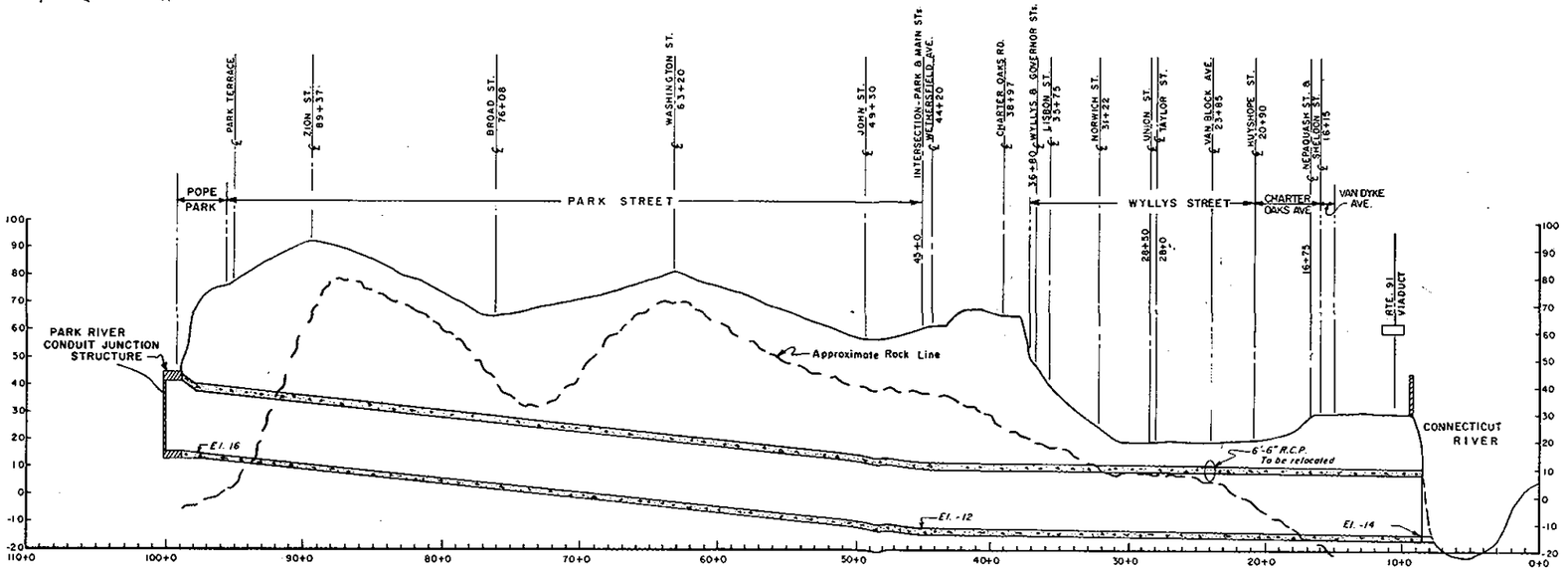



CUT & COVER CONDUIT

AUXILIARY CONDUIT
TYPICAL SECTIONS

SCALE 1" = 10'-0"

10' 0 10' 20'




| REVISION | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

| DR. BY | TR. BY | CH. BY |
|---|---|---|
| J.M.D. | C.H.O. | J.M.L. |

PROJECT ENGINEER

SUBMITTED BY
CHIEF, HYDRAULIC & SANITARY BRANCH

APPROVED
CHIEF ENGINEERING DIV.

CONNECTICUT RIVER FLOOD CONTROL

PARK RIVER AUXILIARY CONDUIT
PLAN PROFILES & SECTIONS

PARK RIVER, CONNECTICUT

DATE JULY 1966

TO ACCOMPANY REPORT
DATED 21 JULY 1966

SCALE AS SHOWN

SHEET 5 OF 5

PLATE E-5

# APPENDIX F

# GEOLOGY

# APPENDIX F

## GEOLOGY

## TABLE OF CONTENTS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|---|---|---|
| 1 | GENERAL GEOLOGY | F-1 |
| 2 | SUBSURFACE INVESTIGATIONS | F-1 |
| | a. Conduit Extension | F-1 |
| | b. Auxiliary Conduit (Tunnel) | F-1 |
| 3 | FOUNDATION CONDITIONS | F-2 |
| | a. Conduit Extension | F-2 |
| | b. Auxiliary Conduit (Tunnel) | F-2 |
| | LOG OF BORINGS (Following Text) | |


## PLATES


| Number | |
|---|---|
| F-1 | Plan of Explorations |
| F-2 | Profiles |
| F-3 | Record of Explorations |
| F-4 | Surficial Geology |

# APPENDIX F

# GEOLOGY

## 1. GENERAL GEOLOGY

The Park River is located in the Connecticut Valley, a broad lowland underlain by Triassic bedrock consisting of conglomerate, sandstone and shale with included sheets of basalt, a volcanic rock commonly called "trap." Although relief in the lowland is generally low and subdued, faulting and differential weathering have left prominent ridges of the resistant "trap" rock projecting above the softer sediments. The region is blanketed by glacial till which occurs at the surface in the higher parts of the lowland. In the low, flat, or gently undulating plains which form the surface throughout most of the region, however, the till is overlain by wide-spread, glacial lake deposits of stratified sand and varved silt and clay. The lake beds also are buried locally but occasionally in extensive areas under glacial outwash, terraces, and delta deposits of sand, silt, and gravel. Thick deposits of recent alluvium consisting of fine sand and silt have accumulated on the broad flood plains of the Connecticut River, and locally, thinner alluvial deposits occur along the flood plains of most of the tributary streams. The banks of the Park River, locally, and the Connecticut River, generally, are blanketed by thick and occasionally extensive artificial fills.

## 2. SUBSURFACE INVESTIGATIONS

a. Conduit Extension. The Greater Hartford Flood Commission has had numerous foundation borings made in the vicinity of Park River and both North and South Branches, Park River, in connection with studies for conduit extensions and the design of the conduit sections being built in conjunction with construction of Interstate Route 84. Logs of these borings pertinent to the recommended project are included in this appendix. The locations of these explorations are shown on "Plan of Explorations" Plate F-1 and "Profiles" Plate F-2.

b. Auxiliary conduit (Tunnel). Subsurface investigations have not been made for the auxiliary conduit. All available data from previous borings and wells in the area have been reviewed. Borings for the existing Jefferson Street tunnel, approximately 700 to 1,200 feet south of the proposed tunnel alignment, were made for the Hartford Bureau of Public Works in 1934. Borings in the vicinity of outlet

area along the Connecticut River were made in connection with flood control dikes and walls constructed by the Providence District, Corps of Engineers, in 1940. Locations and data from wells in the area were obtained from a report, Records of Logs of Selected Wells and Test Borings and Chemical Analyses of Water in North Central Connecticut, prepared by the U. S. Geological Survey, in cooperation with the Connecticut Water Resources Commission. The locations of these borings and wells are shown on Plate F-1. Descriptions and classification of materials encountered in the borings are presented on "Record of Explorations," Plate F-3. Surficial geology of the area is shown on "Surficial Geology" Plate F-4.

## 3. FOUNDATION CONDITIONS

a. Conduit extension. Overburden in the several sections of the conduit extensions consists mainly of glacial lake bottom deposits which rest on till or bedrock. Locally, as at Sections 2 and 4 of the conduit, the lake deposits are thin or missing and till occurs at the ground surface. Throughout most of the area, however, the lake deposits consisting of stratified and varved clay, silt and fine sand, are very thick and extend to depths far below conduit grades. In Sections 2 and 4 the till which constitutes the main overburden, is variable ranging from silty, gravelly sand to sandy, silty gravel with cobbles and boulders scattered throughout. In many reaches the existing stream flows on a cobble and boulder pavement; in other reaches generally thin deposits of muck and peat occur. Overlying the natural materials in scattered but numerous areas are artificial fills composed of sand, silt, gravel, boulders, cinders and trash.

Bedrock is generally deeply buried in the area of the conduit extensions except in some reaches of Sections 2 and 4 where it occurs close to or above conduit grade. As shown on "Surficial Geology," Plate F-4, bedrock outcrops in several areas in Section 2. The bedrock consists of thin-bedded sandstones and shales which trend generally north-south and dip eastward at 15° to 20°. In the vicinity of the fault which crosses the Park River at Section 2 both the trend and dip of the strata vary widely within short distances.

b. Auxiliary conduit (Tunnel). The alignment of the proposed auxiliary conduit and an assumed bedrock profile are shown on "Auxiliary Conduit, Plan, Profile and Sections", Plate E-5. As shown on the profile, open cut excavation and tunnelling in overburden will be required at the intake end of the auxiliary conduit from the Junction Structure to the assumed steep rock face located where the fault shown on Surficial Geology, Plate F-4 crosses the conduit alignment.

The overburden at, and near the Junction Structure consists of lake deposits, mainly sands, silt and clay, underlain by till composed of silty to clayey, gravelly sand with numerous cobbles and boulders. The lake deposits become thin against the rising till surface approaching the steep bedrock face near Park Terrace, and overburden tunnelling in this area will be entirely in till. A deep till-filled valley occurs in the rock surface in the vicinity of Hungerford Street so that the rock surface in this area is expected to be close to or below the roof of the tunnel. Where the tunnel leaves the rock near Lisbon Street, the overburden is composed of lake deposits underlain by till. Further eastward in the vicinity of Van Block Street where the excavation will be in open cut, the overburden at the surface is flood plain alluvium consisting of stratified sand and silt. Underlying the alluvium are the lake bottom varved silt and clay deposits which rest on till or, where till is missing, on the bedrock. Adjacent to the Connecticut River the conduit will go under the existing flood wall and dike in a tunnel which will be excavated in alluvial and lake bottom sands and silts and artificial fills.

The bedrock along the tunnel alignment is a series of interbedded sandstones, shales and basalt. The sandstones and shales are generally thin-bedded, soft to moderately hard and variable in color. The basalt which was emplaced as a series of volcanic flows or sills, is dark gray to black, hard, find grained and close-jointed. Bedding of the series trends approximately normal to the tunnel alignment and dips eastward at $15^{o}$ to $20^{o}$. The steep rock face near the upstream end of the tunnel is probably a fault scarp and, as indicated by borings for the Jefferson Street Tunnel, other smaller faults probably cross the alignment. The tunnelling history for the Jefferson Street Tunnel is not known but the bore diameter was 8 feet, about one-third the diameter proposed for this tunnel. For estimating purposes it is assumed that close support designed for very blocky and seamy rock will be required.

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 8

| | | |
|---|---|---|
| CONTRACTOR | PROJECT NO. | LINE |
| FOREMAN —DRILLER: Higgins | PROJECT NAME: Park River Conduit | STATION |
| INSPECTOR: Batterson | LOCATION: Capitol Ave., Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT 9' FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER S.S. | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2" | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24 | 30 | |

Date Start 10/17 Date Fin. 10/18
SURFACE ELEV. 37.5
GROUND WATER ELEV. ____

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 4 | | | | | | | | | | dry | 1'0" | loam |
| | 7 | | | | | 1'6" | 10 | 12 | 12 | | | 2'0" | rubble |
| | 8 | | | | | | | | | | | | fine sand and silt |
| | 8 | | | | | | | | | | | 4'0" | |
| | 12 | | | | | | | | | | | | |
| 5 | 14 | | | | | 6'6" | 4 | 8 | 10 | | dry | | medium to fine sand, little silt |
| | 18 | | | | | | | | | | | | |
| | 25 | | | | | | | | | | | | |
| | 28 | | | | | | | | | | | 9'0" | |
| | 31 | | | | | | | | | | | | |
| 10 | | | | | | 11'6" | 14 | 21 | 24 | | wet | | fine sand and silt, some |
| | | | | | | | | | | | | | medium to coarse gravel (hardpan) |
| | | | | | | | | | | | | 15'0" | |
| 15 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | r o c k |
| | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | 21'6" | |
| | | | | | | | | | | | | | bottom of boring |
| | | | | | | | | | | | | | note: coring time for 6'6" was 1 hr. 20 min; rock was a medium red shale. Recovery for 6'6" coring equals 4'6". |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 8

D: DRY W: WASHED C: CORED P: PIT A: AUGER UP: UNDISTURBED PISTON
UB: UNDISTURBED BALL CHECK T: THINWALL V: VANE TEST

PROPORTIONS USED: TRACE: 0-10%, LITTLE: 10-20%, SOME: 20-35%, AND: 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 9

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME: Park River Conduit Ext.

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I | S.S | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 12/27 Date Fin. 12/27/60
SURFACE ELEV. 25.1
GROUND WATER ELEV. 24.6

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 19 | | | | | | | | | | COMP WET | 1'6" | GR. COARSE TO FINE SAND & GRAVE |
| | 28 | | | | | | | | | | DENSE | 3'0" | BR. SAND, SIST, GRAVEL, PIECES OF ROCK |
| | 146 | Casing Refused | | | | | | | | | | | |
| | | | C | | | | | | | 3 | | | |
| | | | C | | | | | | | 3 | MEDIUM HARD | | BR. FINE SANDSTONE |
| 5 | | | C | | | | | | | 4 | | | RUN 1 3' to 8' |
| | | | C | | | | | | | 4 | | | RECOVERY 14" |
| | | | C | | | | | | | 6 | | 8'0" | |
| | | | | | | | | | | | | | END OF HOLE 8'0" |
| 10 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 9

D: DRY W: WASHED C: CORED P: PIT A: AUGER UP: UNDISTURBED PISTON
UB: UNDISTURBED BALL CHECK T: THINWALL V: VANE TEST

PROPORTIONS USED TRACE: 0-10%, LITTLE: 10-20%, SOME: 20-35%, AND: 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 10

CONTRACTOR

FOREMAN — DRILLER: Bessette

INSPECTOR: Batterson

PROJECT NO.: 1960-3

PROJECT NAME: Park River Conduit Ext.

LOCATION: Hartford, Conn.

LINE

STATION

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I | M.S | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 12/23 Date Fin. 12/23/60
SURFACE ELEV. 25.6
GROUND WATER ELEV. -3'249

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 | | | | | | | | | | LOOSE | | |
| | 8 | | | | | | | | | | FROZEN | | DARK GRAY SAND & SILT, SOME GRAVEL; CEMENTED TILL & SOFT ROCK |
| | 29 | | | | | | | | | | | | |
| | 186 | Casing Refused | | | | | | | | | DENSE | 4'0" | |
| 5 | | | C | | | | | | | 4 | | | |
| | | | C | | | | | | | 4 | MEDIUM | | RUN 1 4'0" to 9'0" |
| | | | C | | | | | | | 6 | HARD | | REC 13" |
| | | | C | | | | | | | 6 | | | BROWN FINE SANDSTONE |
| | | | C | | | | | | | 5 | | 9'0" | |
| 10 | | | | | | | | | | | | | END HOLE AT 9'0" |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 10

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm

SHEET 1 OF 1
HOLE NO. 11

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME: Park River Conduit Ext.

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I. | S.S. | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24"m | 30" | |

Date Start 12/23 Date Fin. 12/23/60
SURFACE ELEV. 25.3
GROUND WATER ELEV. ~~-0"~~ 24.6

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 | | | | | | | | | | LOOSE | | DARK GRAY FINE SAND & SILT, |
| | 14 | | | | | | | | | | FROZEN | 2'0" | TRACE GRAVEL |
| | 131 | Casing Refused | | | | | | | | | DENSE | 3'0" | SOFT BROWN SANDSTONE |
| | | | C | | | | | | | 4 | | | |
| 5 | | | C | | | | | | | 6 | MEDIUM | | BR. FINE SANDSTONE |
| | | | C | | | | | | | 6 | HARD | | RUN #1 3' to 8' REC. 16" |
| | | | C | | | | | | | 4 | | | |
| | | | C | | | | | | | 8 | | 8'0" | |
| | | | | | | | | | | | | | END HOLE AT 8'0" |
| 10 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT, USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 11

O: ORY W: WASHED C: CORED P: PIT A: AUGER UP: UNDISTURBED PISTON
UB: UNDISTURBED BALL CHECK T: THINWALL V: VANE TEST

PROPORTIONS USED: TRACE: 0-10%, LITTLE: 10-20%, SOME: 20-35%, AND: 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY. CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 12

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME: Park River Conduit Ext.

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.1 | S.S | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 12/22 Date Fin. 12/22
SURFACE ELEV. 25.9
GROUND WATER ELEV. -3' 25.6

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 18 | | | | | | | | | | FROZEN | | GRAY FINE SAND & SILT |
| | 12 | | | | | | | | | | WET | | TRACE GRAVEL & ROOTS |
| | 10 | | | | | | | | | | | 3'0" | |
| | 41 | | | | | | | | | | DENSE | | BR. SAND, SILT, GRAVEL |
| 5 | 186 | Casing Refused | | | | | | | | | MOIST | 5'0" | |
| | | | C | | | | | | | 3 | | | BR.FINE SANDSTONE |
| | | | C | | | | | | | 3 | MEDIUM | | RUN #1 5'TO 10" |
| | | | C | | | | | | | 4 | HARD | | REC. 20" |
| | | | C | | | | | | | 4 | | | |
| | | | C | | | | | | | 5 | | 10'0" | |
| 10 | | | | | | | | | | | | | END HOLE AT 10'0" |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 12

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 1<br>HOLE NO. 13 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | TYPE: CASING W.1 / SAMPLER S.S / CORE BAR. ____<br>SIZE I.D.: 2 1/2 / 1 3/8 / ____<br>HAMMER WT.: 300 / 140 / BIT<br>HAMMER FALL: 24" / 30" / ____ | Date Start 12/21 Date Fin. 12/21/60<br>SURFACE ELEV. ____<br>GROUND WATER ELEV. ____ |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 27 | | | | | | | | | | LOOSE WET | 2'0" | DARK GR. SILT & SAND BOULDERS & RIP RAP |
| | 46 | | | | | | | | | | | | |
| | 82 | | | | | | | | | | DENSE MOIST | | BR. SAND, SILT AND GRAVEL PIECES OF ROCK |
| | 111 | | | | | | | | | | | 5'0" | |
| 5 | 127 | casing refused | | | | | | | | | | | REFUSAL - ROCK<br>END OF HOLE @ 5'0" |
| | | | | | | | | | | | | | (REMOVED MACHINE DUE TO RISING WATERS) |
| 10 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 13

D: DRY W: WASHED C: CORED P: PIT A: AUGER UP: UNDISTURBED PISTON
UB: UNDISTURBED BALL CHECK T: THINWALL V: VANE TEST

PROPORTIONS USED TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2848 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 15

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN — DRILLER: Bessette

PROJECT NAME: Park River Conduit Ext.

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I. | S.S. | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 12/19 Date Fin. 12/19/60
SURFACE ELEV. 26.6 (WATER)
GROUND WATER ELEV. ____

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 1'6" | RIVER WATER (PARK RIVER) |
| | 6 | | | | | | | | | | LOOSE | 3'0" | COBBLES AND BOULDERS |
| | 13 | | | | | | | | | | | | |
| | 29 | | | | | | | | | | DENSE MOIST | | RED BROWN SILT, SOME MEDIUM TO FINE GRAVEL (HARDPAN) |
| 5 | 40 | | | | | | | | | | | 7'0" | |
| | 58 | 1 | D | 18" | 16" | 6'6" | 20 | 27 | 29 | | | | |
| | 187 | Casing Refused | | | | | | | | | | | |
| | | | C | | | | | | | 4 | MEDIUM HARD | | BROWN FINE SANDSTONE |
| | | | C | | | | | | | 4 | | | RUN 1 7' to 12' |
| 10 | | | C | | | | | | | 4 | | | RECOVERY 25" |
| | | | C | | | | | | | 5 | | | |
| | | | C | | | | | | | 5 | | 12'0" | |
| | | | | | | | | | | | | | END HOLE AT 12'0" |
| 15 | | | | | | | | | | | | | NOTE: LOCATION OF BORING #15 CENTERED BETWEEN PREVIOUS LOCATION OF B-14 and B-15 |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 15

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 16

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME: Park River Conduit Ext.

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I | S.S | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 12/17 Date Fin. 12/17/60
SURFACE ELEV. 26.6 (WATER)
GROUND WATER ELEV. ____

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | RIVER WATER (PARK RIVER) |
| | 12 | | | | | | | | | | LOOSE | 8'0" | COBBLES & BOULDERS |
| | 22 | | | | | | | | | | | | |
| 5 | 48 | | | | | | | | | | | | |
| | 40 | 1 | D | 18" | 16" | 6'6" | 12 | 20 | 17 | | DENSE MOIST | | RED BROWN SILT, LITTLE MEDIUM TO FINE GRAVEL (HARDPAN) |
| | 64 | | | | | | | | | | | | |
| | 99 | | | | | | | | | | | | |
| | 124 | | | | | | | | | | | | |
| 10 | 238 | Casing Refused | | | | | | | | | | 10'0" | |
| | | | C | | | | | | | 4 | | | |
| | | | C | | | | | | | 4 | MEDIUM HARD | | BROWN FINE SANDSTONE |
| | | | C | | | | | | | 4 | | | RUN 1 10' to 15' |
| | | | C | | | | | | | 6 | | | RECOVERY 24" |
| 15 | | | C | | | | | | | 6 | | 15'0" | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | END HOLE AT 15'0" |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 16

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 17

| | | |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT 6 FT. AFTER 24 HOURS
AT 6 FT. AFTER 48 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | 1 3/8 |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 10/20/60 Date Fin. 10/21/60
SURFACE ELEV. 38.20
GROUND WATER ELEV.

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 8 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| 5 | 14 | | | | | 5'to | 4 | 4 | 4 | | | | fine to medium sand, some silt, gravel, cobbles, and cinders |
| | 10 | | | | | 6'6" | | | | | | | |
| | 8 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 8 | | | | | 9'6" | 6 | 12 | 6 | | | | |
| 10 | 10 | | | | | to 11' | | | | | | | |
| | 10 | | | | | | | | | | | 12'0" | |
| | 20 | | | | | 12'to | | | | | | | fine to coarse sand, silt, gravel, and cobbles |
| | 29 | | | | | 13'6" | 12 | 14 | 25 | | | | |
| 15 | 39 | | | | | 14'6" | | | | | | | |
| | 36 | | | | | to 15'6" | 21 | 32 | | | | 15'7" | |
| | 25 | | | | | | | | | | | | gravel, sand, and silt |
| | 34 | | | | | | | | | | | | |
| | 33 | | | | | | | | | | | | hardpan |
| | 41 | | | | | 20'to | 19 | 25 | 29 | | | | |
| 20 | 68 | | | | | 21'6" | | | | | | | |
| | | | | | | 21'6" | | | | | | | |
| | | | | | | to 23' | 17 | 31 | 48 | | | | |
| | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | 26'0" | |
| | | | | | | | | | | | | | rock, laminated red shale 2'1" recovery from 5'run |
| | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | 31'0" | |
| | | | | | | | | | | | | | bottom of boring<br>1st foot - 10 min.<br>2nd " - 12 "<br>3rd " - 12 "<br>4th " - 9 "<br>5th " - 8 " |
| | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO _____ FT., USED _____ " CASING THEN _____ " CASING TO _____ FT.

HOLE NO.

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2646 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 18

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER Bessette

PROJECT NAME Park River Conduit Ext.

STATION

INSPECTOR Batterson

LOCATION Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I. | S.S | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 12/14/60 Date Fin. 12/15/60
SURFACE ELEV. 23.7 (Bottom)
GROUND WATER ELEV. 25.7 (W/L)

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL, REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | ROVER WATER (PARK RIVER) |
| | 10 | | | | | | | | | | LOOSE | 3'0" | COBBLES & BOULDERS |
| | 87 | | | | | | | | | | | | |
| | 45 | | | | | | | | | | | | |
| 5 | 53 | 1 | D | 18" | 16" | 6'6" | 24 | 32 | 31 | | VERY DENSE MOIST | | RED BR. SILT, TRACE FINE GRAVEL (HARDPAN) |
| | 94 | | | | | | | | | | | | |
| | 148 | | | | | | | | | | | | |
| | 247 | Casing Refused | | | | | | | | | | 9'0" | |
| 10 | | | C | | | | | | | | BOULDERS | | SANDSTONE BOULDERS |
| | | | C | | | | | | | | | 11'6" | RECOVERED 15" |
| | | | C | | | | | | | 4 | | | |
| | | | C | | | | | | | 6 | MEDIUM HARD | | BROWN FINE SANDSTONE |
| | | | C | | | | | | | 6 | | | RUN 1 11'6" to 16'6" |
| 15 | | | C | | | | | | | 8 | | | RECOVERY 20" |
| | | | C | | | | | | | 8 | | 16'6" | |
| | | | -C- | | | | | | | | | | END HOLE AT 16'6" |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT, USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 16

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2848 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 19

| | | |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I. | SS | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 12/8 Date Fin. 12/8/60
SURFACE ELEV. 26.9
GROUND WATER ELEV. ____

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | | | | | | | | | | LOOSE WET | 2'6" | DARK GRAY SAND & SILT LITTLE MUCK, PIECES OF WOOD |
| | 4 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 29 | | | | | | | | | | MEDIUM COMPACT | | RED SAND, SILT, & GRAVEL |
| | 104 | 1 | D | 18" | 16" | 5'0" | 7 | 12 | 24 | | MOIST | 5'0" | SOME DECOMPOSED RED SHALE |
| 5 | | | C | | | | | | | 2 | | | RED SHALE ROCK |
| | | | C | | | | | | | 2 | MEDIUM HARD | | RUN #1 5' to 10' REC. 30" |
| | | | C | | | | | | | 3 | | | |
| | | | C | | | | | | | 6 | | | |
| | | | C | | | | | | | | | 10'0" | |
| 10 | | | | | | | | | | | | | END HOLE AT 10'0" |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 19

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY. CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 20

| | | |
|---|---|---|
| CONTRACTOR | PROJECT NO. | LINE |
| FOREMAN —DRILLER: Miller | PROJECT NAME | STATION |
| INSPECTOR: Patterson | LOCATION: Capitol Ave., Hartford | OFFSET |

GROUND WATER OBSERVATIONS
AT 13' FT. AFTER 1 HOURS
AT 13' FT. AFTER 24 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2" | 1 3/8" | 1 7/8" |
| HAMMER WT. | 300 | 140 | |
| HAMMER FALL | 24" | 30" | BIT. |

Date Start 10/10 Date Fin. 10/19/60
SURFACE ELEV. 38.55
GROUND WATER ELEV.

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 51 | | | | | | | | | | | 1'-0" | MACADAM |
| | 20 | | | | | | | | | | | | |
| | 25 | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | |
| 5 | 15 | | | | | | | | | | | | |
| | 10 | | | | | 4'6" to 6' | 12 | 10 | 9 | | | | fill, cinders, sand |
| | 10 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | |
| | | | | | | 9'6" to 11' | 4 | 3 | 3 | | | 11'0" | |
| 10 | | | | | | | | | | | | | |
| | | | | | | | | | | | | 13'0" | fine to medium sand, silt, and gravel |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | red shale<br>13' to 16' = 26" rec.<br>16' to 21' = 36" rec. |
| 15 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | 21'0" | |
| | | | | | | | | | | | | | bottom of boring |
| | | | | | | | | | | | | | drill time:<br>1st foot = 10 min.<br>2nd foot = 9 min.<br>3rd foot = 9 min.<br>4th foot = 12 min.<br>5th foot = 11 min.<br>6th foot = 8 min.<br>7th foot = 9 min. |
| 25 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO _____ FT., USED _____ " CASING THEN _____ " CASING TO _____ FT.

HOLE NO.

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 31

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME

STATION

INSPECTOR: B tterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/14 Date Fin. 11/14/60
SURFACE ELEV. Rivers
GROUND WATER ELEV. 31.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Park River |
| 5 | | | | | | | | | | | | 8'0" | |
| | 5 | | | | | | | | | | soft | | gray coarse to fine sand, |
| | 4 | | | | | 10'6" | 4 | 6 | 3 | | wet | | and gravel, mixed with rock |
| 10 | 12 | | | | | | | | | | | 11'0" | |
| | 8 | | | | | | | | | | soft | 12'0" | gray silt and muck |
| | 33 | | | | | | | | | | | | |
| | 47 | | | | | | | | | | compact | | red clay & silt, little fine |
| | 192 | | | | | | | | | | moist | | sand, and gravel |
| 15 | 237 | | | | | 15'6" | 12 | 18 | 47 | | | 16'0" | |
| | | | d | | | | | | | 8 | | | |
| | | | c | | | | | | | 8 | hard | | top of rock |
| | | | c | | | | | | | 11 | | | run 1 16'to 21' rec. 30" |
| | | | c | | | | | | | 16 | | | |
| 20 | | | c | | | | | | | 18 | | 21'0" | red shale rock |
| | | | | | | | | | | | | | end of hole at 21'0" |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT, USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 31

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 1<br>HOLE NO. 32 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | TYPE / CASING / SAMPLER / CORE BAR.<br>SIZE I.D. 2 1/2 / 1 3/8<br>HAMMER WT. 300 / 140<br>HAMMER FALL 24" / 30"<br>BIT. | Date Start 11/22 Date Fin 11/12/60<br>SURFACE ELEV. ____<br>WATER ELEV. 31.8 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 3'0" | Park River |
| 5 | 1<br>1<br>1<br>1 | | | | | 6'6" | 1 | 0 | 0 | | soft wet | 7'0" | Black soft muck |
| 10 | 1<br>1<br>1<br>2<br>2<br>2 | | | | | 11'6" | 1 | 3 | 2 | | spft wet | 13'0" | gray soft silt, pieces of rotted wood |
| 15 | 67<br>300<br>390 | | | | | 14'6" | 12 | 27 | 39 | | dense moist | 15'0" | red clay & silt, little |
| | | casing refused<br>no penetration with sampler | | | | | | | | | medium hard rock | 19'6" | gray medium hard shale, chopped and drove from 15'6" to 19'6" using 300 lb. wt.and fishtail bit |
| 20 | | | | | | | | | | | | | edd hole @ 19'6" |
| | | | | | | | | | | | | | note: moved boring 32 twice (5' each move) refused at 12'& at 13'0" |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 32

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 33

| | | |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN --DRILLER Bessette | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/12 Date Fin. 11/14/60
SURFACE ELEV. ____
GROUND WATER ELEV. 31.8

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL, REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 3'0" | Park River |
| 5 | 1 | | | | | | | | | | soft wet | | dark gray muck |
| | 2 | | d | | | 6'6" | 1 | 1 | 3 | | | | green silt & muck |
| | 3 | | | | | | | | | | | 8'0" | |
| | 4 | | | | | | | | | | soft wet hard | | gray silt, trace fine sand |
| | 5 | | | | | | | | | | | 11'6" | |
| 10 | 12 | | | | | | | | | | comp wet | 13'0" | red clay & silt, little fine |
| | 12 | | d | | | 11'6" | 7 | 14 | 20 | | | | sand, and gravel |
| | 17 | | | | | | | | | | med hard rock | | run 1 13' to 18' rec. 36" |
| | 46 | | | | | | | | | | | | gray shale |
| | 107 | | d | | | 13'0" | 12 | 13 | 50 | | | 18'0" | |
| 15 | | | c | | | | | | | 6 | | | end hole @ 18' |
| | | | c | | | | | | | 6 | | | |
| | | | c | | | | | | | 8 | | | |
| | | | c | | | | | | | 11 | | | |
| | | | c | | | | | | | 11 | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 33

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY. CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 34

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/11/60 Date Fin. 11/11/60
SURFACE ELEV. ____
GROUND WATER ELEV. 31.8

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Park River |
| 5 | | | | | | | | | | | | | |
| | | | | | | | | | | | | 10'0" | |
| 10 | 4 | | | | | | | | | | soft wet | | dark gray coarse to fine sand, some gravel, mixed with |
| | 4 | | | | | | | | | | | 13'0" | black muck |
| | 8 | | | | | | | | | | | | red clay, trace fine sand & gravel |
| | 3 | | | | | | | | | | | | |
| 15 | 2 | | | | | | | | | | | | |
| | 3 | 1 | d | | | 15'6" | 1 | 2 | 3 | | | 16'0" | |
| | 22 | | | | | | | | | | compact moist | | red clay & silt, some coarse gravel, little fine sand |
| | 30 | | | | | | | | | | | | |
| | 43 | | | | | | | | | | | | |
| 20 | 97 | | | | | | | | | | | | |
| | 128 | 2 | d | | | 20'6" | 22 | 31 | 20 | | | | |
| | 209 | | | | | | | | | | dense moist | | |
| | 301 | | | | | | | | | | | | |
| | | 3 | d | | | 24'0" | 40 | 65 | | | | 24'0" | |
| 25 | | | c | | | | | | | | very dense dry | | cored for penetration, using fish tail bit 24' to 28' |
| | | | c | | | | | | | | | | |
| | | | c | | | | | | | | | | |
| | | | c | | | sampler refused @ 28' | | | | | | 28'0" | very dense till & pieces of rock |
| | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | end hole @ 28' |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 34

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 35

| | | |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER BBessette | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/9 Date Fin. 11/11/60
SURFACE ELEV. ____
GROUND WATER ELEV. 31.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| 5 | 1 | | | | | | | | | | soft | | dark gray muck, traces of peat |
| | 1 | | | | | 6'6" | 1 | 0 | 1 | | wet | | |
| | 1 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| 10 | 1 | | | | | | | | | | | | |
| | 2 | | | | | 11'6" | 1 | 1 | 1 | | | 11'0" | |
| | 2 | | | | | | | | | | soft wet | | red clay |
| | 3 | | | | | | | | | | | 13'0" | |
| | 16 | | | | | | | | | | | | |
| 15 | 21 | | | | | | | | | | | | |
| | 18 | | | | | 15'6" | 10 | 16 | 20 | | hard moist | | red clay & some silt, trace of fine sand, little coarse to fine gravel |
| | 24 | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | |
| | 28 | | | | | | | | | | | | |
| | 30 | | | | | | | | | | | | |
| 20 | 20 | | | | | 21'6" | 12 | 18 | 24 | | | | |
| | 26 | | | | | | | | | | | | |
| | 31 | | | | | | | | | | | | |
| | 28 | | | | | | | | | | | | |
| | 44 | | | | | | | | | | | | |
| 25 | 36 | | | | | 26'6" | 10 | 16 | 22 | | | | |
| | 48 | | | | | | | | | | | | |
| | 55 | | | | | | | | | | | | |
| | 72 | | | | | | | | | | | 29'0" | |
| | 187 | | | | | | | | | | very dense moist | | red clay & silt, little fine sand & gravel (cemented) |
| 30 | 146 | | | | | 30'6" | 37 | 46 | 72 | | | | |
| | 281 | | | | | | | | | | | | |
| | 382 | | | | | | | | | | | 33'0" | |
| | | | | | | | | | | | med hard | | run #1 33'6o 36' rec.6" red shale rock |
| 35 | | | | | | | | | | | | 36'0" | |
| | | | | | | | | | | | hard | | run #2 36'to 40' red shale rock |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | 40'0" | end of hole 40' |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 35

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm | SHEET 1 OF 1<br>HOLE NO. 36 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT _____ FT. AFTER _____ HOURS
AT _____ FT. AFTER _____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/11 Date Fin. 11/11/60
SURFACE ELEV. _____
GROUND WATER ELEV. 31.8

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 3'0" | Park River |
| | 2 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| 5 | 4 | | | | | 6'6" | 2 | 2 | 2 | | soft wet | | dark grey muck & clayey silt |
| | 7 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| 10 | 2 | | | | | 11'6" | 1 | 2 | 2 | | | | grey clay & silt |
| | 3 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | 13'0" | |
| | 6 | | | | | | | | | | | | red clay, trace of fine sand |
| | 7 | | | | | | | | | | | | |
| 15 | 4 | | | | | 15'6" | 2 | 3 | 7 | | | | |
| | 18 | | | | | | | | | | | 17'0" | |
| | 29 | | | | | | | | | | | | |
| | 37 | | | | | | | | | | | | red clay; some silt; little fine sand and coarse to fine gravel |
| | 74 | | | | | | | | | | | | |
| 20 | 40 | | | | | 21'6" | 20 | 27 | 41 | | | | |
| | 63 | | | | | | | | | | | | |
| | 78 | | | | | | | | | | | | |
| | 197 | | | | | | | | | | | | |
| | 208 | | | | | | | | | | | | |
| 25 | 264 | | | | | 26'6" | 22 | 29 | 33 | | | | |
| | 418 | | | | | | | | | | | 27'0" | |
| | | | | | | | | | | | | | very dense till & red shale rock fragments |
| 30 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | end hole @ 30'0" |
| | | | | | | | | | | | | | note: cored from 27' to 30' using fish tail bit |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO _____ FT., USED _____ " CASING THEN _____ " CASING TO _____ FT.

HOLE NO. 36

O = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 1<br>HOLE NO. 37 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER: Bessette | PROJECT NAME: Park River Conduit Ext. | STATION |
| INSPECTOR: Battersen | LOCATION: Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | CASING / SAMPLER / CORE BAR.<br>TYPE<br>SIZE I.D. 2 1/2 / 1 3/8<br>HAMMER WT. 300 / 140<br>HAMMER FALL 24" / 30"<br>BIT. | Date Start 11/9/60 Date Fin. 11/9/60<br>SURFACE ELEV. ____<br>GROUND WATER ELEV. 31.5 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS · INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | | | | | | | | | | | | | Park River |
| | | | | | | | | | | | | 10'0" | |
| 10 | 1 | | | | | | | | | | wet | 11'0" | dark gray muck |
| | 1 | | | | | | | | | | | | |
| | 1 | 1 | d | | | 13'6" | 1 | 1 | 1 | | | | red clay & silt, some fine sand & gravel, cemented |
| | 2 | | | | | | | | | | | | |
| 15 | 27 | 2 | d | | | 15'6" | 16 | 28 | 37 | | dense moist | | |
| | 44 | | | | | | | | | | | | |
| | 40 | | | | | | | | | | | | |
| | 190 | | | | | | | | | | | | |
| | 265 | 3 | d | | | 19'6" | 29 | 47 | 75 | | | 19'6" | |
| 20 | | 4 | d | | | 20'0" | 155 | refused | | | hard | | red shale |
| | | | | | | | | | | | | 23'0" | (decomposed rock) |
| | | sampler refused | | | | | | | | | | | end hole @ 23'0" |
| 25 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | note: chopped & drove using 300 lb.wt. for penetration from 20' to 23' |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 37

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 1<br>HOLE NO. 38 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960 - 3 | LINE |
| FOREMAN —DRILLER Giggey | PROJECT NAME | STATION |
| INSPECTOR | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT 7'6" FT. AFTER 24 HOURS<br>AT 7'6" FT. AFTER 48 HOURS | TYPE / SIZE I.D. / HAMMER WT. / HAMMER FALL<br>CASING: 2 1/2 / 300 / 24<br>SAMPLER: 1 3/8 / 140 / 30<br>CORE BAR. / BIT. | Date Start 10/25 Date Fin. 10/26/60<br>SURFACE ELEV. 37.8<br>GROUND WATER ELEV. |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 6 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | sandy silt, cinders, |
| | 5 | | | | | | | | | | | | |
| 5 | 8 | | | | | 5' to | | | | | | | misc. fill |
| | 12 | | | | | 6'6" | 3 | 2 | 2 | | | | |
| | 5 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | 9'0" | |
| | 12 | | | | | 10' to | | | | | | | |
| 10 | 8 | | | | | 11'6" | 1 | 1 | 1 | | | | loose silt and clay, traces organic material; unable to recover sample at 10' to 11'6" and at 15' to 16'6" |
| | 9 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 11 | | | | | 15' to | | | | | | | |
| 15 | 10 | | | | | 16'6" | 1 | 1 | 1 | | | | |
| | 12 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | 19'0" | |
| | 10 | | | | | 20' to | | | | | | | |
| 20 | 19 | | | | | 21'6" | 7 | 7 | 4 | | | | silt, clay, fine gravel, & organic material. |
| | 12 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | 24'0" | |
| | 14 | | | | | 25' to | | | | | | | |
| 25 | | | | | | 26'6" | 22 | 28 | 30 | | | | silt, clay, and fine gravel "hardpan" |
| | | | | | | | | | | | | 26'6" | |
| | | | | | | | | | | | | | bottom of boring |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO _____ FT., USED _____" CASING THEN _____" CASING TO _____ FT.

HOLE NO. 38

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 39

CONTRACTOR

PROJECT NO.

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME: Park River Conduit Extensions

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I | 5.5 | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/8 Date Fin. 11/9/60
SURFACE ELEV. ____
River WATER ELEV. 31.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS. INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 4.0 | Park River |
| 5 | 1 4 11 13 | 1 | D | 18" | 14" | 6'6" | 2 | 1 | 2 | | loose wet | 8'0" | Gray coarse to fine sand & gravel; mixed with river muck, boulders |
| 10 | 4 2 2 2 3 6 | 2 | D | 18" | 13" | 11'6" | 1 | 1 | 1 | | soft wet | 14'0" | red clay |
| 15 | 27 33 48 164 260 | 3 | D | 18" | 16" | 15'6" | 12 | 16 | 18 | | hard moist very dense dry | 20'0" | red clay & silt, little fine sand, some gravel<br>same as #4 (cemented) |
| 20 | 299 | 4 | D | 18" | 17" | 19'6" | 28 | 47 | 51 | | hard | 23'6" | red shale decomposed rock |
| | | 5 | D | 3" | 3" | 23'6" | 150 | | | | | | end hole @ 23'6"<br>note: chopped & drove using 300 lb. wt. for penetration from 20' to 23'6" |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 39

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: GREATER HFD FLOOD COMM

SHEET 1 OF 1
HOLE NO. 40

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER
GIBBEY

PROJECT NAME

STATION

INSPECTOR
BATTERSON

LOCATION
HARTFORD, CONN

OFFSET

GROUND WATER OBSERVATIONS
AT 8'-6" FT. AFTER 24 HOURS
AT 8'-6" FT. AFTER 48 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | 2½ | 1½ | |
| SIZE I.D. | | | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24 | 30 | |

Date Start 10-26-60 Date Fin. 10-26-60
SURFACE ELEV. 37.5
GROUND WATER EL2V.

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 6 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | SILT AND FINE SAND |
| | 8 | | | | | | | | | | | | WITHE CINDER FILL |
| | 5 | | | | | | | | | | | | |
| 5 | 6 | | | 18 | | 6.5 | 6 | 4 | 3 | | | | |
| | 15 | | | | | | | | | | | | |
| | 20 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | 9.0 | |
| 10 | 6 | | | 18 | | 11.5 | 2 | 2 | 2 | | SLIPPED | SAMPLE | |
| | 6 | | | | | | | | | | | | SILT, CLAY, SAND |
| | 8 | | | | | | | | | | | | AND FINE GRAVEL |
| | 5 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | |
| 15 | 9 | | | 18 | | 16.5 | 4 | 3 | 3 | | | | |
| | 9 | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | 18.0 | |
| | 8 | | | | | | | | | | | | |
| 20 | 8 | | | 18 | | 21.5 | 3 | 3 | 3 | | | | SILTY SAND AND |
| | 15 | | | | | | | | | | | | ORGANIC MATERIAL |
| | 17 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| 25 | 12 | | | 18 | | 26.5 | 6 | 24 | 28 | | | 25.0 | |
| | 28 | | | | | | | | | | | | |
| | 58 | | | | | | | | | | | | SILT, CLAY, SOME |
| | 64 | | | | | | | | | | | | SAND AND GRAVEL |
| | 110 | | | | | | | | | | | | "HARDPAN" |
| 30 | | | | 18 | | 31.5 | 50 | 50 | 50 | | | | |
| | | | | | | | | | | | | 31.5 | |
| | | | | | | | | | | | | | BOTTOM OF BORE |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO _____ FT., USED _____ " CASING THEN _____ " CASING TO _____ FT.

HOLE NO. 40

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 4-1

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN — DRILLER: Bessette

PROJECT NAME

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | 1 3/8 |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/6 Date Fin. 11/8/60
SURFACE ELEV. ____
GROUND WATER ELEV. Riser 31.7

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 1 | | | | | | | | | | | | Park River |
| | 1 | | | | | | | | | | | 8'4" | |
| 10 | 1 | 1 | D | 18" | 18" | 10'6" | w | o | h | | soft wet | | dark gray muck<br>red gray clay; trace of fine red sand; varved |
| | 1 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| 15 | 7 | 2 | D | 18" | 17" | 15'6" | w | o | h | | | | same as #1 |
| | 7 | | | | | | | | | | | 16'6" | |
| | 13 | | | | | | | | | | med comp | 18'6" | red fine sand & clay, some medium to fine gravel |
| | 146 | | | | | | | | | | | | |
| | 160 | 3 | D | 6" | 4" | 19' | 125 | | | | med hard | 20'0" | red cemented till, pieces of shale |
| 20 | 294 | | | | | | | | | | | | |
| | | | c | | | | | | | 9 | | | |
| | | | c | | | | | | | 10 | hard | | hard red shale rock |
| | | | c | | | | | | | 20 | | | |
| | | | c | | | | | | | 22 | | | |
| 25 | | | c | 60" | 36" | 25' | | | | 20 | | 25'0" | |
| | | | | | | | | | | | | | end hole @ 25/0' |
| 30 | | | | | | | | | | | | | rock:<br>5'run, 3' recovery |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 41

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 42

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Giggey

PROJECT NAME

STATION

INSPECTOR: Batterson

LOCATION: Hartford

OFFSET

GROUND WATER OBSERVATIONS
AT 4'6" FT. AFTER 24 HOURS
AT 4'6" FT. AFTER 48 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2" | 1 3/8" | 1 3/8 |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24 | 30 | |

Date Start 10/24 Date Fin. 10/25/60
SURFACE ELEV. 38.6
WATER ELEV.

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | | | | | | 6 | 7 | 10 | | | | |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 6 | | | | | 5'to | | | | | | | fine sand and silt, |
| 5 | 10 | | | | | 6'6" | 6 | 6 | 5 | | | | misc. fill |
| | 9 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | 9'0" | |
| | 4 | | | | | 10'to | | | | | | | |
| 10 | 5 | | | | | 11'6" | 1 | 2 | 2 | | | | |
| | 3 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | silt and clay, some |
| | 4 | | | | | | | | | | | | organic material |
| | 11 | | | | | 15'to | | | | | | | |
| 15 | 6 | | | | | 16'6" | 1 | 2 | 2 | | | | |
| | 6 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | 19'0" | |
| | 13 | | | | | | | | | | | | fine to medium sand, silt, |
| 20 | 10 | | | | | 20'to | 3 | 3 | 2 | | | | some organic material |
| | 13 | | | | | 21'6" | | | | | | 22'0" | |
| | 36 | | | | | | | | | | | | hardpan |
| | 56 | | | | | 23'to | | | | | | | |
| 25 | 130 | | | | | 24' | 50 | 150 | | | | | red silt, clay, and gravel |
| | 80 | | | | | | | | | | | | |
| | 84 | | | | | | | | | | | | |
| | 110 | | | | | | | | | | | | |
| | 90 | | | | | | | | | | | | |
| 30 | 82 | | | | | 30'to | | | | | | | |
| | 250 | | | | | 31' | 145 | lost sample | | | | | |
| | 250 | | | | | | | | | | | 32'0" | |
| | | | | | | | | | | | | 34'0" | drilled for penetration hardpan |
| 35 | | | | | | | | | | | | 36'0" | boulder 34'-36' |
| | | | | | | | | | | | | | silt, clay, & gravel hardpan |
| 40 | | | | | | | | | | | | | bottom of boring 40'0" |

GROUND SURFACE TO _____ FT., USED _____" CASING THEN _____" CASING TO _____ FT.

HOLE NO. 42

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 43

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/14 Date Fin. 1/15/60
SURFACE ELEV. ____
WATER ELEV. 31.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| | 1 | | | | | | | | | | soft wet | | black-gray muck & silt |
| 5 | 1 | | | | | | | | | | | | |
| | 2 | | | | | 5'0" | 1 | 2 | 1 | | | 6'0" | |
| | 3 | | | | | | | | | | soft wet | | brown red coarse to fine sand, some gravel & muck (tree roots) |
| | 2 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| 10 | 8 | | | | | 10'6" | 3 | 7 | 4 | | | | |
| | 4 | | | | | | | | | | | 13'0" | |
| | 4 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | firm wet | | red clay & silt, little fine sand and gravel |
| 15 | 7 | | | | | 15'6" | 4 | 4 | 5 | | | | |
| | 19 | | | | | | | | | | | 17'0" | |
| | 213 | | | | | | | | | | | | |
| | 264 | | c | | | | | | | | | | boulders, 17' to 20' rec. 19" sandstone |
| | 187 | | c | | | | | | | | | | |
| | 124 | | c | | | | | | | | boulder | 20'0" | |
| 20 | 128 | | d | | | 21'6" | 17 | 18 | 125 | | | | red clay & silt, little fine sand & gravel impregnated with cobbles & boulders |
| | 274 | | casing refused | | | | | | | | | | |
| | | | c | | | | | | | | dense moist | | |
| | | | c | | | | | | | | | | |
| | | | c | | | | | | | | | | |
| 25 | | 5 | d | | | 26'6" | sampler refused | | | | | 26'0" | |
| | | | | | | | | | | | | | end hole @ 26'0" |
| | | | | | | | | | | | | | note: cored for penetration 22' to 26' with fishtail bit |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 43

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 44

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME

STATION

INSPECTOR

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/15 Date Fin. 11/15/60
SURFACE ELEV. ____
GROUND WATER ELEV. 31.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| | 2 | | | | | | | | | | soft wet | | black muck, some gray clayey silt |
| | 3 | | | | | | | | | | | | |
| 5 | 2 | | | | | | | | | | | | |
| | 2 | | | | | 5'6" | 1 | 2 | 1 | | | | |
| | 2 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | 8'0" | |
| | 2 | | | | | | | | | | soft wet | | red clay |
| | 5 | | | | | | | | | | | | |
| 10 | 5 | | | | | 11'6" | 2 | 2 | 2 | | | | |
| | 7 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | 14'0" | |
| | 11 | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | |
| 15 | 40 | | | | | 16'6" | 6 | 8 | 15 | | | | |
| | 29 | | | | | | | | | | med hard wet | | red clay & silt, little fine sand, some coarse to fine gravel |
| | 41 | | | | | | | | | | | | |
| | 49 | | | | | | | | | | | | |
| | 53 | | | | | | | | | | | | |
| 20 | 40 | | | | | 21'6" | 12 | 15 | 15 | | | | |
| | 63 | | | | | | | | | | hard moist | | |
| | 89 | | | | | | | | | | | | |
| | 160 | | | | | | | | | | | | |
| | 243 | | | | | | | | | | | | |
| 25 | 197 | | d | | | 26'6" | 20 | 32 | 31 | | | | |
| | 184 | | c | | | | | | | | dense moist | | |
| | | | c | | | | | | | | | | |
| | | | c | | | | | | | | | | |
| | | | c | | | | | | | | | | |
| 30 | | | d | | | 31'6" | 23 | 34 | 89 | | | 31'6" | |
| | | | | | | | | | | | | | refusal at 31'6" |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | note: cored for penetration 26'6" to 30' using fishtail bit. |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 44

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 45

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/15 Date Fin. 11/16/60
SURFACE ELEV. ____
WATER ELEV. 31.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ SOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS, INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| | 1 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | |
| 5 | 1 | | | | | | | | | | | | |
| | 1 | | d | | | 6'6" | 1 | 1 | 2 | | soft wet | 6'6" | black coarse to fine sand mixed with muck, some gravel |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| 10 | 2 | | | | | | | | | | | | |
| | 3 | | | | | 11'6" | 1 | 3 | 2 | | soft wet | | black gray silt, pieces of rotted wood |
| | 5 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| 15 | 4 | | | | | | | | | | | 15'0" | |
| | 5 | | | | | 16'6" | 1 | 2 | 1 | | | | |
| | 5 | | | | | | | | | | | | red gray clay |
| | 7 | | | | | | | | | | | 18'0" | |
| | 37 | | | | | | | | | | firm wet | 20'0" | red clay, silt, trace fine sand |
| | 140 | | | | | | | | | | | | |
| 20 | 220 | | c | | | | | | | | boulder | 22'0" | red sandstone boulder rock |
| | 186 | | c | | | | | | | | | | |
| | 97 | | | | | | | | | | | | |
| | 84 | | | | | 26'6" | | | | | | | |
| | 186 | | | | | | | | | | dense moist | | red clay & silt, little fine sand, some gravel, cemented |
| 25 | 206 | | d | | | 21'6" | 18 | 23 | 30 | | | | |
| | 247 | casing refused | | | | | | | | | | 27'0" | |
| | | | c | | | | | | | 8 | | | |
| | | | c | | | | | | | 8 | med hard | | run 1 27' to 32' rec. 24" red shale |
| | | | c | | | | | | | 6 | | | |
| 30 | | | c | | | | | | | 4 | | | |
| | | | c | | | | | | | 6 | | 32'0" | |
| | | | | | | | | | | | | | end hole @32'0" |
| | | | | | | | | | | | | | Note: lost water while coring @ 31'0" drove ole. at 32' refused |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 45

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

X

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 2
HOLE NO. 46

| | | |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT 20 FT. AFTER 24 HOURS
AT 20 FT. AFTER 48 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | SS | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | 1 3/8 |

Date Start 10/25 Date Fin. 10/26/60
SURFACE ELEV. 50.8
GROUND WATER ELEV.

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 27 | | | | | | | | | | | 1'-0" | TRAP Rock & Cobbles |
| | 20 | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | |
| | 17 | | | | | | | | | | | | |
| 5 | 16 | | | | | 5' to | | | | | | | |
| | 27 | | | | | 6'6" | 17 | 15 | 15 | | | | fine sand, silt, gravel, |
| | 21 | | | | | | | | | | | | & cobbles |
| | 29 | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | | |
| | 26 | | | | | 9'6" | | | | | | | |
| 10 | 18 | | | | | to 11' | 19 | 14 | 17 | | | | |
| | 17 | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | | |
| | 22 | | | | | 15' to | | | | | | 15'0" | |
| 15 | 18 | | | | | 16'6" | 3 | 3 | 3 | | | | |
| | 13 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | silt, clay, some fine sand |
| | 13 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| 20 | 26 | | | | | | | | | | | | |
| | 25 | | | | | 20' to | 2 | 2 | 2 | | | | |
| | 13 | | | | | 21'6" | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 13 | | | | | 24'6" | 2 | 1 | 2 | | | | |
| 25 | 13 | | | | | to 26' | | | | | | | |
| | 12 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| | 13 | | | | | 28'6" | 1 | 2 | 2 | | | | |
| 30 | 12 | | | | | to 30' | | | | | | 31'0" | |
| | 24 | | | | | 32'6" | 3 | 4 | 5 | | | | |
| | 15 | | | | | to 34' | | | | | | | silt, fine sand, & gravel |
| | 13 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| 35 | 16 | | | | | 36'6" | | | | | | | |
| | 18 | | | | | to 37'6" | 6 | 8 | 8 | | | | |
| | 17 | | | | | | | | | | | 38'6" | |
| | 19 | | | | | | | | | | | | |
| 40 | 24 | | | | | 40' to | 8 | 9 | 9 | | | | fine sand & silt |

GROUND SURFACE TO ____ FT., 41'6" USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 46

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2848 MAIN STREET
GLASTONBURY. CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 2 OF 2
HOLE NO. 46

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Miller

PROJECT NAME

STATION

INSPECTOR: Batterson

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT 20 FT. AFTER 24 HOURS
AT 20 FT. AFTER 48 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | SS | |
| SIZE I.D. | 2 1/2" | 1 3/8" | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 10/25 Date Fin. 10/26/60
SURFACE ELEV. 50.8
GROUND WATER ELEV.

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 38 | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | 42'0" | fine sand & silt |
| 45 | | | | | | 45'to 46'6" | 21 | 28 | 31 | | | | silt, fine sand, gravel |
| 50 | | | | | | 50'to 51'6" | 54 | 65 | 80 | | | 51'6" | |
| | | | | | | | | | | | | | bottom of boring |
| 55 | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | |
| 70 | | | | | | | | | | | | | |
| 75 | | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | | |

GROUND SURFACE TO _____ FT., USED _____ " CASING THEN _____ " CASING TO _____ FT.

HOLE NO. 46

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION

HOLE NO. F.C. 5
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn. DATE START 2/4/60 GND. ELEV. 33.1 M.S.L.
PED. CLASS. _____ DATE FINISH 2/5/60 G. W. DEPTH 2'3"

CASING O.D. 3" I.D. 2½"
SAMPLER O.D. 2" I.D. 1-3/8"
WEIGHT OF HAMMER 300 & 140 lbs.
INSIDE LENGTH OF SAMPLER 20"
HAMMER FALL CASING 24" SAMPLER 30"

| DEPTH BELOW GND. SURF | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 | 6/12 | 12/18 | 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 | 10 | 40 | 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| =0 | 3 | 1 | | | | | | | | | | | | Brown Silt & Sand, Some Bands of Clay 0" - 16' |
| | 4 | | 1 | 2 | | | | | | | | | | |
| | 4 | | | | 1 | | 18" | | | | | | | |
| | 3 | | | | | | | | | | | | | |
| | 5 | 2 | | | | | | | | | | | | |
| | 8 | | 2 | 3 | | | 18" | | | | | | | |
| | 7 | | | | 5 | | | | | | | | | |
| | 6 | | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | | |
| -10 | 9 | 3 | | | | | | | | | | | | |
| | 6 | | 3 | 3 | | | 18" | | | | | | | |
| | 7 | | | | 4 | | | M | BROWN | | | | | |
| | 7 | | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | |
| | 8 | 4 | | | | | | | | | | | | |
| | 17 | | 2 | 3 | | | 18" | | | | | | | |
| | 20 | | | | 9 | | | | | | | | | |
| | 24 | | | | | | | | | | | | | |
| | 39 | | | | | | | | | | | | | |
| -20 | 78 | 5 | | | | | | | | | | | | Brown Silt, Clay & Gravel Form of Glacier Till 17'0" - 40'0" |
| | 119 | | 10 | 12 | | | 18" | | | | | | | |
| | 154 | | | | 25 | | | | | | | | | |
| | 168 | | | | | | | | | | | | | |
| | 172 | | | | | | | | | | | | | |
| | 226 | 6 | | | | | | | | | | | | |
| | 90 | | 12 | 14 | | | 18" | | | | | | | |
| | 72 | | | | | | | | | | | | | |
| | 84 | | | | | | | | | | | | | |
| | 125 | | | | | | | | | | | | | |
| -30 | 135 | 7 | | | | | | | | | | | | |
| | 140 | | 10 | 12 | | | 18" | M | BROWN | | | | | |
| | 172 | | | | 17 | | | | | | | | | |
| | 190 | | | | | | | | | | | | | |
| | 289 | | | | | | | | | | | | | |
| | 320 | 8 | | | | | | | | | | | | |
| | 120 | | 14 | 18 | | | 18" | | | | | | | |
| | 100 | | | | 22 | | | | | | | | | |
| | 160 | | | | | | | | | | | | | |
| | 152 | | | | | | | | | | | | | |
| | 173 | | | | | | | | | | | | | |
| -40 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| -50 | | | | | | | | | | | | | | |

Av. Speed 1st Run
1.10 min. - 2.11 min.
3.10 min. - 4.13 min.
5.17 min.

Av. Speed 2nd Run
1. 4 min. - 2. 5 min. -
3.12 min. - 4.11 min.
5. 15 min.

Av. Speed 3rd Run
1.17 min. - 2. 16 min.

DRILLED FROM: 40'-45'
1st Run Rec. 1'5" Core Sandstone
45'-50' -2nd Run--Recov. 2'7" Core Shale
50'-52'-3rd Run-Recov. 1' Core
Total Drilled 12'
HOLE COMPLETED AT 52'
DRILLER: WILLIAM ANDERSON

DRILLING INSPECTOR H.L. Stubing ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. F.C. 5

Form No. 15

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 1
HOLE NO. 56

| | | |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/16 Date Fin. 11/16/60
SURFACE ELEV. ____
GROUND WATER ELEV. 31.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| | 1 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | Soft Wet | | |
| 5 | 1 | | d | | | 6'6" | 1 | 0 | 0 | | | | Black Gray Muck & Silt |
| | 1 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | 8'0" | |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| 10 | 2 | | | | | 11'6" | 1 | 1 | 1 | | | | Gray Silt & C ay |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | 13'6" | |
| | 4 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| 15 | 4 | | | | | 16'6" | 1 | 1 | 1 | | | | Red Clay |
| | 5 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| 20 | 4 | | | | | 21'6" | 2 | 2 | 1 | | | | |
| | 4 | | | | | | sample slipped | | | | | 22'6" | |
| | 12 | | | | | | | | | | | | |
| | 25 | | | | | | | | | | ↓ | | Red Clay & Silt, little Fine Sand & Some Coarse to Fine Gravel |
| | 36 | | | | | | | | | | hard moist | | |
| 25 | 47 | | | | | 26'6" | 14 | 24 | 50 | | | | |
| | 147 | | | | | | | | | | | 28'0" | |
| | 208 | | | | | | | | | | | 29'0" | Red Soft Shale Boulder |
| | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | very dense moist | | Red Clayey Silt, little Fine Sand, some Coarse to Fine Grave., cemented |
| | | | | | | 34'6" | 45 | 70 | 42 | | | | |
| | Note: cored for penetration from 28' to 33' and 33' to 38' | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 39'6" | 47 | 54 | 79 | | | | |
| 40 | | | | | | | | | | | | 39'6" | end hole @ 39'6" |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 56

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Commission

SHEET 1 OF 2
HOLE NO. 57

CONTRACTOR

PROJECT NO.

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME

STATION

INSPECTOR

LOCATION: Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/16/60 Date Fin. 11/17/60
SURFACE ELEV. ____
GROUND WATER ELEV. 31.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS: INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| 5 | 4 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| | 7 | 1 | d | | | 8'6" | 1 | 5 | 2 | | soft wet | | black silt & muck, some sand & gravel; pieces of decomposed wood |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| 10 | 3 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 2 | 2 | d | | | | | | | | | 14'0" | |
| 15 | 2 | 2 | d | | | 15'6" | 1 | 1 | 2 | | soft wet | | red clay |
| | 3 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| 20 | 7 | 3 | d | | | 21'6" | 1 | 2 | 2 | | | | |
| | 4 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| 25 | 6 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | |
| 30 | 6 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | 32'0" | |
| | 87 | 5 | d | | | 33'6" | 28 | 23 | 22 | | hard moist | | red clay & silt, some gravel trace of sand |
| | 119 | | | | | | | | | | | | |
| 35 | 111 | | | | | | | | | | | | |
| | 89 | | | | | | | | | | | | |
| | 93 | | | | | | | | | | | | |
| | 176 | 6 | d | | | 38'6" | 22 | 28 | 41 | | | 38'0" | cemented till |
| | | | | | | | | | | | very hard dry | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 57

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 2 OF 2<br>HOLE NO. 57 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | TYPE: CASING ____ SAMPLER ____ CORE BAR. ____<br>SIZE I.D.: 2 1/2 1 3/8<br>HAMMER WT.: 300 140 BIT.<br>HAMMER FALL: 24" 30" | Date Start 11/16/60 Date Fin. 11/17/60<br>SURFACE ELEV. ____<br>GROUND WATER ELEV. 31.5 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C | | | | | | | | very dense | 41'6" | red cemented till |
| | | | C | | | | | | | | | | |
| | | | C | | | | | | | 8 | medium hard | | run 1 41'6" to 46'6" rec. 12" red sandstone |
| | | | C | | | | | | | 8 | | | |
| 45 | | | C | | | | | | | 10 | | | note: shale did not recover |
| | | | C | | | | | | | 6 | | 46'6" | |
| | | | C | | | | | | | 8 | | | edd hole @ 46'6" |
| 50 | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 57

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY. CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 1 OF 2
HOLE NO. 58

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME: Park River Conduit Ext.

STATION

INSPECTOR: Batterson

LOCATION

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | 1 3/8 |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/21/60 Date Fin. 11/22/60
SURFACE ELEV. ____
RIVER WATER ELEV. 31.7

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| | 1 | | | | | | | | | | soft | | black muck, rubbish, tree |
| | 4 | | | | | | | | | | | | roots, silt |
| 5 | 4 | | | | | | | | | | wet | | |
| | 3 | | | | | | | | | | | 7'0" | |
| | 1 | | | | | | | | | | | | - |
| | 2 | | | | | | | | | | soft | | gray silt and clay |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | wet | | |
| 10 | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | gray red silt & clay |
| | 2 | | | | | | | | | | | | |
| 15 | 2 | 1 | D | | | 16'6" | 1 | 1 | 1 | | | 17'0" | |
| | 3 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| 20 | 7 | 2 | D | | | 21'6" | 1 | 2 | 1 | | soft | | red clay |
| | 10 | | | | | | | | | | wet | | |
| | 10 | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| 25 | 10 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 17 | | | | | | | | | | | | |
| 30 | 27 | | | | | | | | | | | 31'0" | |
| | 57 | 3 | D | | | 32'6" | 17 | 22 | 28 | | | | |
| | 43 | | | | | | | | | | dense | | red clay and silt, some |
| | 55 | | | | | | | | | | moist | | coarse to fine sand & gravel |
| | 62 | | | | | | | | | | | | |
| 35 | 113 | 4 | D | | | 36'6" | 18 | 27 | 23 | | | | |
| | 144 | | | | | | | | | | | | |
| | 194 | | | | | | | | | | | | |
| | 207 | | | | | | | | | | | 39'0" | |
| 40 | 218 | 5 | | | | | | | | | compact moist | | red fine sand, little silt & gravel |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 58

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Htfd.Flood Comm.

SHEET 2 OF 2
HOLE NO. 58

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bessette

PROJECT NAME: Park River Conduit Ext.

STATION

INSPECTOR: Batterson

LOCATION

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | 1 3/8 |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/21/60 Date Fin. 11/22/60
SURFACE ELEV. ____
river WATER ELEV. 31.7

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 74 | | | | | | | | | | compact moist | | red fine sand, little silt, some gravel |
| | 83 | | | | | | | | | | | | |
| | 97 | | | | | | | | | | | 43'0" | |
| 46 | 193 | | | | | | | | | | | | |
| 5 | 287 | 6 | D | | | 45'6" | 32 | 75 | 100 | | | | red sand, silt & gravel, little clay - cemented occasional cobble |
| | | | C | | | | | | | | very dense moist | | |
| | | | C | | | | | | | | | | cored with diamond bit for penetration from 45'6" to 53'0" |
| 50 | | | C | | | | | | | | | | |
| 10 | | | C | | | | | | | | | | |
| | | | C | | | | | | | | | | |
| | | | C | | | | | | | | | 53'0" | |
| 55 | | | C | | | | | | | 7 | | | run 1, 53' to 58' rec. 32" |
| 15 | | | C | | | | | | | 8 | hard | | red shale |
| | | | C | | | | | | | 12 | | | |
| | | | C | | | | | | | 12 | | | |
| | | | C | | | | | | | 19 | | 58'0" | |
| 60 | | | | | | | | | | | | | end hole @ 58'0" |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 58

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION
~~Sheet One of Two~~

HOLE NO. F.C. 6
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn. DATE, START 2/2/60 GND. ELEV. 40.8 M.S.L.
PED. CLASS. _____ DATE, FINISH 2/5/60 G. W. DEPTH ~~24 hrs 10'8"~~ 11'4"

CASING O.D. 4" I.D. 3½"
SAMPLER O.D. 2" I.D. 1-3/8"
WEIGHT OF HAMMER 300 & 140 lbs.
INSIDE LENGTH OF SAMPLER 20"
HAMMER FALL CASING 24" SAMPLER 30"

| DEPTH BELOW GND. SURF | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 | 6/12 | 12/18 | 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 | 10 | 40 | 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 24 | 1 | 4 | 3 | | | 18" | D | | | | | | Misc. Fill-Cinders, Ashes, Nails Wood, concrete, Some Red Clay & Gravel |
| | 18 | | | | 1 | | | | | | | | | |
| | 11 | | | | | | | | | | | | | 0' - 19' |
| | 10 | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | |
| | 3 | 2 | 3 | 2 | | | | | | | | | | |
| | 10 | | | | 3 | | 18" | D | | 300 lb. H.W. 17" Drop 2½" Spoon I.D. | | | | |
| | 11 | | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | | |
| 10 | 12 | | | | | | | | | | | | | |
| | 5 | 3 | 2 | 1 | | | | | | | | | | |
| | 5 | | | | 1 | | 10" | M | | | | | | |
| | 4 | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | |
| | 23 | | | | | | | | | | | | | |
| | 5 | 4 | 3 | 2 | | | | | | | | | | |
| | 5 | | | | 2 | | 12" | W | | | | | | |
| | 6 | | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | |
| 20 | 11 | 5 | 2 | 3 | | | | | | | | | | Gray Silt, Some Clay, Leaves & Pieces of Wood, Some Vegetation 19' - 23'6" |
| | 16 | | | | 2 | | 13" | W | | | | | | |
| | 10 | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | |
| | 11 | 6 | H.W.H.W. | | | | | | | | | | | Varved Clay 23'6" - 41' |
| | 12 | | | | 1 | | 18" | | | | | | | |
| | 13 | | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | | |
| 30 | 13 | T. 1 Pushed | | | | | 24" | | | Shipping Wt. 14½ lbs. | | | | |
| | 13 | | 31' - 33' | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | | |
| | 18 | T. 2 Pushed | | | | | 24" | | | 15½ lbs. | | | | |
| | 17 | | 36' - 38' | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | | |
| | 20 | | | | | | | | | | | | | |
| | 31 | | | | | | | | | | | | | |
| 40 | 36 | | | | | | | | | | | | | |
| | 94 | | | | | | | | | Note: | | | | Glacier Till - Clay, Silt & Gravel |
| | 262 | | | | | | | | | 300 lb. H.W. | | | | |
| | 270 | | | | | | | | | 17" Drop | | | | |
| | 278 | | | | | | | | | 2½" Spoon I.D. | | | | 41' - 59' |
| | 110 | 7 | 32 | 68 | | | 18" | M | | | | | | |
| | 103 | | | | 62 | | | | | | | | | |
| | 177 | | | | | | | | | | | | | |
| | 282 | | | | | | | | | | | | | |
| 50 | 216 | | | | | | | | | | | | | |

DRILLING INSPECTOR H. D. Stubing ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. F.C. 6

Form No. 15

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION
Sheet Two of Two

HOLE NO. B.C. 6
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn. DATE, START 2/3/60 GND. ELEV. _____
PED. CLASS. _____ DATE, FINISH 2/8/60 G. W. DEPTH _____

CASING O.D. _____ I.D. _____
SAMPLER O.D. _____ I.D. _____
WEIGHT OF HAMMER _____
INSIDE LENGTH OF SAMPLER _____
HAMMER FALL
CASING ___ SAMPLER ___

| DEPTH BELOW GND. SURF | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 | 6/12 | 12/18 | 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 | 10 | 40 | 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 152 | 8 | 21 | 26 | | | | | | | | | | |
| | 180 | | | | 24 | | 18" | | | | | | | |
| | 372 | | | | | | | | | | | | | |
| | 253 | | | | | | | | | | | | | |
| | 416 | | | | | | | M | RED-BROWN | | | 140 lb. H.W. 30" Drop 1-3/8" Spoon I.D. | | |
| | 178 | 9 | 36 | 51 | | | 18" | | | | | | | |
| | 288 | | | | | | | | | | | | | |
| | 348 | | | | | | | | | | | | | |
| | 533 | 10 | 88 | Per 4" | | | 4" | | | | | | | |
| 10 | | | 300 | lb. H.W. | | | | M | RED | | | | | Broken Shale Frag. Some Glacier Till - 59'-61'6" |
| | | | | | | | | | | | | | | DRILLED ROCK: 61'6"-64'31" C. Rec. 64' - 69' 43" C. Rec. Red Shale |
| 20 | | | | | | | | | | | | | | HOLE COMPLETED AT 69' |
| | | | | | | | | | | | | | | Min. Per Ft. 1 Ft. 10 Min. 2 Ft. 13 " 3 Ft. 7 " 4 Ft. 13 " 5 Ft. 13 " 6 Ft. 11 " 7 Ft. 17 " 8 Ft. 17 " |
| 30 | | | | | | | | | | | | | | DRILLER: DAVID KITCHEN |
| 40 | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | |

DRILLING INSPECTOR _____ ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. B.C. 6

Form No. 15

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY. CONN. | CLIENT: Greater Hartford Flood Comm | SHEET 1 OF 1<br>HOLE NO. 59 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER: Bessette | PROJECT NAME: Park River Conduit Ext. | STATION |
| INSPECTOR: Batterson | LOCATION: Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | TYPE: CASING 2 1/2, SAMPLER 1 3/8, CORE BAR. ____<br>SIZE I.D.<br>HAMMER WT. 300, 140, BIT. ____<br>HAMMER FALL 24", 30" | Date Start 11/21 Date Fin 11/21/60<br>SURFACE ELEV. ____<br>GROUND WATER ELEV. 3/.7 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| | 2 | | | | | | | | | | loose wet | | gray fine sand & silt mixed with black muck and rotted leaves-wood roots |
| | 1 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| 5 | 1 | | d | | | 6'6" | 1 | 0 | 2 | | | | |
| | 1 | | | | | | | | | | | 7'0" | |
| | 1 | | | | | | | | | | soft wet | | gray red clay & silt |
| | 1 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| 10 | 1 | | d | | | 11'6" | 2 | 1 | 1 | | | 11'6" | |
| | 2 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| 15 | 2 | | d | | | 16'6" | 1 | 1 | 1 | | soft wet | | red clay |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| 20 | 4 | | d | | | 21'6" | 1 | 1 | 1 | | | | |
| | 6 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| 25 | 12 | | d | | | 26'6" | 5 | 6 | 7 | | | 26'0? | |
| | 18 | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | | |
| | 27 | | | | | | | | | | firm wet | | red clay some coarse to fine gravel |
| | 31 | | | | | | | | | | | | |
| 30 | 45 | | d | | | 31'6" | 4 | 5 | 5 | | | 33'0" | |
| | 58 | | | | | | | | | | | | |
| | 67 | | | | | | | | | | | | |
| | 110 | | | | | | | | | | | | |
| | 164 | | | | | | | | | | | | |
| 35 | 90 | | d | | | 36'6" | 28 | 42 | 29 | | very dense moist | | red clayey silt, some coarse to fine sand & gravel, few cobbles, cemented |
| | 186 | | | | | | | | | | | | |
| | 204 | | | | | | | | | | | | |
| | 321 | | | | | | | | | | | | |
| 40 | 280 | | d | | | 41'6" | 33 | 58 | 67 | | | | end of hole @ 41'6" |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT. HOLE NO. 59

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 1<br>HOLE NO. 60 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | CASING / SAMPLER / CORE BAR.<br>TYPE<br>SIZE I.D. 2 1/2 / 1 3/8<br>HAMMER WT. 300 / 140<br>HAMMER FALL 24" / 30"<br>BIT. | Date Start 11/19 Date Fin. 11/21<br>SURFACE ELEV. ____<br>GROUND WATER ELEV. 3/.7 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| | 4 | | | | | | | | | | loose wet | | black coarse to fine sand; some gravel, tree roots, muck |
| | 2 | | | | | | | | | | | 5'0" | |
| 5 | 2 | | d | | | 6'6" | 2 | 1 | 2 | | | | |
| | 1 | | | | | | | | | | soft wet | | red gray clay, some silt |
| | 2 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | |
| 10 | 1 | | d | | | 11'6" | 1 | 0 | 0 | | | | |
| | 2 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| 15 | 3 | | d | | | 16'6" | 1 | 1 | 1 | | | | |
| | 3 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | 20'0" | |
| 20 | 5 | | d | | | 21'6" | 1 | 2 | 2 | | | | red clay, little coarse to fine gravel, trace coarse to fine sand |
| | 7 | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| 25 | 6 | | d | | | 26'6" | 2 | 3 | 3 | | | | |
| | 8 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | |
| | 9 | | | | | | | | | m | firm wet | | |
| 30 | 8 | | d | | | 31'6" | 3 | 4 | 6 | | | 32'0" | |
| | 14 | | | | | | | | | | | | |
| | 27 | | | | | | | | | | | | |
| | 33 | | | | | | | | | | | | |
| | 64 | | | | | | | | | | | | red clay & silt, some coarse to fine gravel, trace fine sand |
| 35 | 84 | | d | | | 35'6" | 27 | 36 | 46 | | very dense moist | | |
| | 137 | | | | | | | | | | | | |
| | 249 | | | | | | | | | | | | |
| | 274 | | | | | | | | | | | | |
| 40 | 301 | | d | | | 41'6" | 32 | 47 | 53 | | | | same (cemented)<br>Bottom of Boring at 41'-6" |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 60

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 2<br>HOLE NO. 61 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | CASING / SAMPLER / CORE BAR.<br>TYPE<br>SIZE I.D. 2 1/2 / 1 3/8<br>HAMMER WT. 300 / 140<br>HAMMER FALL 24 / 30<br>BIT. | Date Start 11/25 Date Fin. 11/25/60<br>SURFACE ELEV. ____<br>WATER ELEV. 31.7 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 2'0" | Park River |
| | 4 | | | | | | | | | | loose wet | 4'0" | gray coarse to fine sand & gravel, boulders, debris on river bottom |
| 5 | 13 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 3 | 1 | D | | | 6'6" | 3 | 3 | 4 | | firm wet | 7'0" | gray red silt, some clay |
| | 3 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | soft wet | | red gray clay |
| 10 | 3 | 2 | D | | | 11'6" | 2 | 2 | 1 | | | | |
| | 5 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| 15 | 2 | 3 | D | | | 16'6" | 1 | 1 | 1 | | | | red clay |
| | 2 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| 20 | 4 | 4 | D | | | 21'6" | w | o | h | | | | sample #4 slipped twice recovered 3rd try |
| | 3 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| 25 | 2 | 5 | D | | | 26'6" | w | o | h | | | | |
| | 4 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| 30 | 3 | 6 | D | | | 31'6" | 1 | 0 | 0 | | | | |
| | 7 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| 35 | 3 | 7 | D | | | 36'6" | 2 | 2 | 2 | | | | Samples #3 thru 7 same |
| | 8 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| 40 | 11 | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 61

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 2 OF 2
HOLE NO. 61

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: Bennette

PROJECT NAME: Park River Conduit Ext.

STATION

INSPECTOR: Batterson

LOCATION

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | SIT. |
| HAMMER FALL | 24 | 30 | |

Date Start 11/25 Date Fin. 11/25/60
SURFACE ELEV. ____
~~GROUND~~ WATER ELEV. 31.7 river

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | 12 | | | | | | | | | | soft wet | | red clay, little fine to coarse gravel |
| | 13 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 46 | | | | | | | | | | | 44'0" | |
| 5 | 228 | 8 | D | | | 45'6" | 22 | 23 | 28 | | very dense moist | | red sand, silt, & gravel cemented with little clay (till) |
| 50 | | | | | | | | | | | | 50'0" | |
| 10 | | | | | | | | | | | | | end hole @ 50'0" |
| 55 | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 61

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

FC 7

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION
Sheet 1 of 2

HOLE NO. 7
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn. DATE, START 1-29-60 GND. ELEV. 47.5 M.S.L.
PED. CLASS. _____ DATE, FINISH 2-3-60 G. W. DEPTH 13' 7"

CASING O.D. 3" I.D. 2½"
SAMPLER O.D. 2" I.D. 1 3/8"
WEIGHT OF HAMMER 300 & 140 lbs.
INSIDE LENGTH OF SAMPLER 20"
HAMMER FALL CASING 24" SAMPLER 30"

| DEPTH BELOW GND. SURF | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 | 6/12 | 12/18 | 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 | 10 | 40 | 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 38 | | | | | | | | | | | | | |
| | 21 | | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | | | |
| | 27 | | | | | | | M | BR | | | | | 0' to 11' |
| | 40 | | | | | | | | | | | | | Misc. Fill |
| | 21 | | | | | | | | | | | | | Red Clay, Shale Frag. |
| | 11 | 1 | 4 | 8 | | | 18" | | | | | | | Some Cinders |
| | 13 | | | | 9 | | | | | | | | | |
| | 8 | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | |
| 10 | 17 | | | | | | | | | | | | | |
| | 8 | 2 | 11 | 6 | | | | | | | | | | 68 |
| | 21 | | | | 4 | | 18" | | | | | | | |
| | 28 | | | | | | | | | | | | | |
| | 23 | | | | | | | M | BR | | | | | 11' to 23' |
| | 27 | | | | | | | | | | | | | |
| | 21 | 3 | 8 | 8 | | | 18" | | | | | | | Brown Clay |
| | 21 | | | | 10 | | | | | | | | | |
| | 25 | | | | | | | | | | | | | |
| | 27 | | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | | | |
| 20 | 14 | 4 | 2 | 2 | | | 18" | | | | | | | |
| | 11 | | | | 3 | | | | | | | | | |
| | 9 | | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | |
| | 8 | 5 | 1 | 2 | | | 18" | | | | | | | 23' to 58' |
| | 10 | | | | 1 | | | | | | | | | |
| | 10 | | | | | | | | | | | | | |
| | 11 | | | | | | | M | R BR | | | | | Varved Clay |
| | 12 | | | | | | | | | | | | | |
| 30 | 9 | 6 | 1 | 1 | | | 18" | | | | | | | |
| | 9 | | | | 2 | | | | | | | | | |
| | 11 | | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | | |
| | 11 | 7 | 1 | 2 | | | 18" | | | | | | | |
| | 14 | | | | 1 | | | | | | | | | |
| | 14 | | | | | | | | | | | | | |
| | 19 | | | | | | | | | | | | | |
| | 27 | | | | | | | | | | | | | |
| 40 | 19 | 8 | 2 | 1 | | | 18" | | | | | | | |
| | 17 | | | | 2 | | | | | | | | | |
| | 16 | | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | | |
| | 19 | | | | | | | | | | | | | |
| | 14 | 9 | 2 | 2 | | | 18" | | | | | | | |
| | 16 | | | | 2 | | | | | | | | | |
| | 18 | | | | | | | | | | | | | |
| | 21 | | | | | | | | | | | | | |
| 50 | 23 | | | | | | | | | | | | | |

DRILLING INSPECTOR H. D. Stubing ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. 7

Form No. 15

FC 7

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION
Sheet 2

HOLE NO. 7
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn. DATE, START _____ GND. ELEV. _____
PED. CLASS. _____ DATE, FINISH _____ G. W. DEPTH _____

CASING O.D. _____ I.D. _____
SAMPLER O.D. _____ I.D. _____
WEIGHT OF HAMMER _____
INSIDE LENGTH OF SAMPLER _____
HAMMER FALL CASING ___ SAMPLER ___

| DEPTH BELOW GND. SURF. | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 6/12 12/18 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 10 40 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|
| 0 | 18 | 10 | 1 2 2 | 18" | | R | | |
| | 24 | | | | M | BR | | |
| | 23 | | | | | | | |
| | 25 | | | | | | | |
| | 27 | | | | | | | |
| | 24 | 11 | 2 2 | 18" | | | | |
| | 27 | | 2 | | | | | |
| | 58 | ( | 58' to 59'6" | | | | | |
| | 186 | (12 | 23 46 | 18" | | | | |
| 10 | 213 | | 71 | | | | | 58' to 70' 6" |
| | 312 | | | | | | | Glacer Till |
| | 216 | | | | | | | |
| | 221 | | | | M | RED | | |
| | 220 | | | | | | | |
| | 224 | | | | | | | |
| | 186 | 13 | 18 22 | 18" | | | | |
| | 209 | | 30 | | | | | |
| | 243 | | | | | | | |
| | 245 | | | | | | | |
| | 526 | | | | | | | |
| 20 | 124 | 14 | 41 for 4" | 4" | | | | |
| | 145 | (15 | 70'6" to 73' | | M | BR | 70'4" to 70'6" Boulder | 70'6" to 73' Br. Fine to Med. Sand |
| | 186 | (Washed Samp. | ) | | | | | |
| Drilled ahead first | 211 | | | | | | | 73' to 87'7" |
| | 236 | | | | | | | |
| | 93 | 16 | 26 36 | 18" | | | 74'3" to 74'5" Boulder | |
| | 186 | | 42 | | | | | |
| From 70' | 212 | | | | | | | Glacer Till |
| | 321 | | | | | | | |
| 30 | 386 | | | | M | | 79'7" to 79'11" Boulder | |
| to | 174 | 17 | 31 39 | 18" | | | | |
| | 268 | | | | | | | |
| 87'7" | 317 | | | | | | | |
| | 388 | | | | | | | |
| | 426 | | | | | | | |
| | No | 18 | 36 44 | 13" | | | | |
| | Pipe | | 56 | | | | | |
| | | | | | | | FT. PER MIN | Top of Rock 87'7" |
| | | | | | | | 6 - 13 | Run #1 |
| 40 | | | | | | | 7 - 14 | 87'7" to 92'7" |
| | | | | | | | 8 - 17 | 36" Core Rec. |
| | | | | | | | 9 - 13 | Run #2 |
| | | | | | | | 10 - 14 | 92'7" to 97'7" |
| | | | | | | | | 4'10½" Core Rec. |
| | | | | | | | | Bottom of Hole 97'7" |
| 50 | | | | | | | | |

DRILLING INSPECTOR _____ ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. 7

Form No. 15

Driller - David Kitchen

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: GREATER HFD FLOOD COMM

SHEET 1 OF 2
HOLE NO. 62

| | | |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN — DRILLER: MILLER | PROJECT NAME | STATION |
| INSPECTOR: BATTERSON | LOCATION: HARTFORD, CONN | OFFSET |

GROUND WATER OBSERVATIONS
AT 5 FT. AFTER 24 HOURS
AT 5 FT. AFTER 48 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2½ | 1½ | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24 | 30 | |

Date Start 10-27 Date Fin. 10-31
SURFACE ELEV. 40.5
GROUND WATER ELEV.

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | |
| 5 | 1 | | | 18 | | 6.5 | 2 | 2 | 2 | | | | SILT, CLAY, SAND AND CINDERS — FILL |
| | 5 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| 10 | 22 | | | | | 11.5 | 9 | 7 | 6 | | | | (LOST SAMPLE AT 10.0) |
| | 24 | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | 12.0 | |
| | 19 | | | | | | | | | | | | |
| | 19 | | | | | | | | | | | | SILT, CLAY AND FINE SAND |
| 15 | 22 | | | 18 | | 16.5 | 3 | 2 | 2 | | | | |
| | 18 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | 17.0 | |
| | 7 | | | 18 | | 18.5 | 2 | 2 | 2 | | | | FINE SAND, SILT AND |
| | 7 | | | | | | | | | | | 19.0 | ORGANIC MATERIAL |
| 20 | 7 | | | 18 | | 21.5 | 1 | 1 | 1 | | | | |
| | 11 | | | | | | | | | | | | SILT AND CLAY (VARVED) |
| | 6 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| 25 | 12 | | | 18 | | 26.5 | 1 | 1 | 1 | | | | |
| | 9 | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| 30 | 12 | | | 18 | | 31.5 | 1 | 1 | 1 | | | | |
| | 12 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | |
| 35 | 12 | | | 18 | | 36.5 | 1 | 1 | 1 | | | | |
| | 12 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO _____ FT., USED _____ " CASING THEN _____ " CASING TO _____ FT.

HOLE NO.

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

**ENGINEERING SERVICES INC.**
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: GREATER HFD. FLOOD COMM

SHEET 2 OF 2
HOLE NO. 62

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN —DRILLER: MILLER

PROJECT NAME

STATION

INSPECTOR: BATTERSON

LOCATION: HARTFORD, CONN.

OFFSET

GROUND WATER OBSERVATIONS
AT 5 FT. AFTER 24 HOURS
AT 5 FT. AFTER 48 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2½ | 1½ | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24 | 30 | |

Date Start 10-27 Date Fin. 10-31
SURFACE ELEV. 40.5
GROUND WATER ELEV.

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 18 | | 41.5 | 1 | 1 | 1 | | | | |
| | | | | | | | | | | | | | SILT AND CLAY (VARVED) |
| 45 | | | | 18 | | 46.5 | 1 | 1 | 1 | | | | |
| | | | | | | | | | | | | | |
| 50 | | | | 18 | | 51.5 | 1 | 2 | 2 | | | | |
| | | | | | | | | | | | | | |
| 55 | | | | 18 | | 56.5 | 2 | 2 | 2 | | | | |
| | | | | | | | | | | | | | |
| 60 | | | | 18 | | 61.5 | 2 | 2 | 2 | | | | |
| | | | | | | | | | | | | | |
| 65 | | | | 18 | | 66.5 | 2 | 2 | 2 | | | | |
| | | | | | | | | | | | | 69.0 | |
| 70 | | | | 18 | | 70.5 | 45 | 52 | 80 | | | | SILT, CLAY AND GRAVEL HARDPAN |
| 75 | | | | 0.5 | | 75.5 | 200 | | | | | 75.5 | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO.

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| | | |
|---|---|---|
| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY. CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 3<br>HOLE NO. 80 |
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Betterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | TYPE: CASING W.1 / SAMPLER SS / CORE BAR.<br>SIZE I.D.: 2 1/2 / 1 3/8<br>HAMMER WT.: 300 / 140<br>HAMMER FALL: 24 / 30<br>BIT. | Date Start 12/2 Date Fin. 12/3/60<br>SURFACE ELEV. ____<br>GROUND WATER ELEV. RIVER 36.0 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS: INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | RIVER WATER | 2'8" | NORTH BRANCH PARK RIVER |
| | 6 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | LOOSE WET | | DARK GRAY COARSE TO FINE SAND AND GRAVEL, ROOTS, MUCK, BOULDERS |
| | 8 | | | | | | | | | | | | |
| 5 | 4 | 1 | D | 18" | 14" | 6'6" | 7 | 4 | 4 | | | 6'0" | |
| | 3 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | SOFT WET | | GRAY SILT & TRACE FINE SAND, SOME CLAY |
| | 4 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | 10'0" | |
| 10 | 4 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | GRAY-BROWN VARVED CLAY |
| | 3 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| 15 | 2 | 2 | D | 18" | 16" | 16'6" | 1 | 2 | 1 | | | | |
| | 6 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| 20 | 4 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| 25 | 3 | 3 | D | 18" | 18" | 26'6" | 1 | 1 | 1 | | | | |
| | 3 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| 30 | 4 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| | 3 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | |
| 35 | 4 | 4 | D | 18" | 16" | 36'6" | 1 | 1 | 2 | | | | |
| | 7 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| 40 | 4 | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 80

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

ENGINEERING SERVICES INC.
2846 MAIN STREET
GLASTONBURY, CONN.

CLIENT: Greater Hartford Flood Comm.

SHEET 2 OF 3
HOLE NO. 80

CONTRACTOR

PROJECT NO. 1960-3

LINE

FOREMAN — DRILLER Bessette

PROJECT NAME Park River Conduit Ext.

STATION

INSPECTOR Batterson

LOCATION Hartford, Conn.

OFFSET

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I. | SS | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 12/2 Date Fin. 12/3/60
SURFACE ELEV. ____
GROUND WATER ELEV. RIVER 36.0

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 -5 | | 5 | D | 18" | 16" | 46'6" | 1 | 2 | 2 | | SOFT WET | | BROWN GRAY VARVED CLAY |
| 50 -10 | | | | | | | | | | | | | |
| 55 -15 | | 6 | D | 18" | 16" | 56'6" | 1 | 2 | 2 | | | | |
| 60 -20 | | | | | | | | | | | | | |
| 65 -25 | | 7 | D | 18" | 18" | 66'6" | 2 | 2 | 2 | | | | |
| 70 -30 | | | | | | | | | | | | | |
| 75 -35 | | 8 | D | 18" | 18" | 76'6" | 2 | 2 | 3 | | | | |
| 80 -40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 80

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| | | |
|---|---|---|
| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 2 OF 3<br>HOLE NO. 80 |
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN — DRILLER Bessette | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | TYPE: CASING w.i, SAMPLER SS, CORE BAR. ____<br>SIZE I.D.: 2 1/2, 1 3/8, ____<br>HAMMER WT.: 300, 140, BIT.<br>HAMMER FALL: 24", 30" | Date Start 12/2 Date Fin 12/3/66<br>SURFACE ELEV. ____<br>GROUND WATER ELEV. 36.0 RIVER |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | TYPE | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 85 5 | | 9 | D | 18" | 14" | 86'6" | 2 | 2 | 3 | | SOFT WET | | BROWN VARVED CLAY |
| 90 10 | | 10 | D | 18" | 13" | 95'6" | 28 | 22 | 20 | | | 92'0" | |
| 95 15 | | 11 | D | 18" | 15" | 96'6" | 7 | 15 | 21 | | HARD MOIST | 95'0" | BROWN SILT |
| 100 20 | | 12 | D | 18" | 14" | 102'6" | 18 | 16 | 20 | | COMPACT WET | 100'0" | BROWN FINE SAND, LITTLE SILT |
| 105 25 | | 13 | D | 18" | 13" | 107'6" | 23 | 31 | 37 | | DENSE MOIST | | BROWN FINE SAND, SILT, & MEDIUM TO FINE GRAVEL<br>CEMENTED TILL |
| 110 30 | | sampler refused at 109'0" | | | | | | | | | | 109'0" | |
| | | | | | | | | | | | | | END OF HOLE AT 109'0" |
| 115 35 | | | | | | | | | | | | | |
| 120 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT. HOLE NO. 80

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 3<br>HOLE NO. 81 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER: Bessette | PROJECT NAME: Park River Conduit Ext. | STATION |
| INSPECTOR: Batterson | LOCATION: Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | TYPE: CASING W, I; SAMPLER SS; CORE BAR. ____<br>SIZE I.D.: 2 1/2; 1 3/8; ____<br>HAMMER WT.: 300; 140; BIT.<br>HAMMER FALL: 24"; 30" | Date Start 12/1 Date Fin. 12/60<br>SURFACE ELEV. ____<br>WATER ELEV. 36.0 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | RIVER WATER | 3'0" | NORTH BRANCH PARK RIVER |
| 5 | 12 7 8 6 6 5 | | | | | | | | | | LOOSE WET | 6'0" | BOULDERS-GRAY COARSE TO FINE SAND & GRAVEL, SOME MUCK |
| 10 | 4 2 2 2 1 2 | 1 | D | 18" | 16" | 10'0" | 2 | 3 | 2 | | SOFT WET | 12'0" | GRAY SILT, TRACE OF FINE SAND |
| 15 | 1 3 3 4 2 | 2 | D | 18" | 18" | 16'6" | 1 | 2 | 2 | | | | GRAY BROWN CLAY, FINE SAND LAYERS |
| 20 | 2 4 6 9 8 | 3 | D | 18" | 18" | 21'6" | 2 | 3 | 2 | | | | GRAY-BROWN VARVED CLAY |
| 25 | 4 6 7 7 8 | 4 | D | 18" | 16" | 26'6" | 2 | 3 | 2 | | | | |
| 30 | 8 7 7 8 8 | | | | | | | | | | | | |
| 35 | 6 8 10 11 | 5 | D | 18" | 16" | 36'6" | 2 | 2 | 2 | | | | |
| 40 | 10 | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 81

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY. CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 2 OF 3<br>HOLE NO. 81 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | W.I | SS | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 12/1 Date Fin. 12/2/60
SURFACE ELEV. ____
GROUND WATER ELEV. RIVER 36.0

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 5 | | | | | | | | | | | SOFT WET | | BROWN GRAY VARVED CLAY |
| | | 6 | D | 18" | 16" | 46'6" | 2 | 2 | 2 | | | | |
| 50 10 | | | | | | | | | | | | | |
| 55 15 | | | | | | | | | | | | | |
| | | 7 | D | 18" | 12" | 56'6" | 2 | 1 | 2 | | | | |
| 60 20 | | | | | | | | | | | | | |
| 65 25 | | | | | | | | | | | | | |
| | | 8 | D | 18" | 16" | 66'6" | 2 | 2 | 3 | | | | |
| 70 30 | | | | | | | | | | | | | |
| 75 35 | | | | | | | | | | | | | |
| | | 9 | D | 18" | 16" | 76'6" | 2 | 3 | 2 | | | | |
| 80 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 81

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
US = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 3 OF 3<br>HOLE NO. 81 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Bessette | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | TYPE: CASING W.1, SAMPLER SS, CORE BAR. ____<br>SIZE I.D.: 3 1/2" 1 3/8", BIT ____<br>HAMMER WT.: 300 140<br>HAMMER FALL: 24" 30" | Date Start 12/1 Date Fin. 12/2/60<br>SURFACE ELEV. ____<br>GROUND WATER ELEV. 36.0 RIVER |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 85 | | | | | | | | | | | SOFT WET | | BROWN VARVED CLAY |
| | | 10 | D | 18" | 16 | 86'6" | 2 | 3 | 3 | | | | |
| 90 | | | | | | | | | | | | 93'0" | |
| 95 | | 11 | D | 18" | 14" | 95'0" | 7 | 12 | 18 | | MEDIUM HARD WET | | BR.SILT,TRACE FINE SAND |
| | | | | sample slipped twice | | | | | | | | | |
| | | | | could not recover | | | | | | | | 99'0" | |
| 100 | | 12 | D | 18" | 12" | 101'6" | 8 | 14 | 19 | | COMPACT WET | | BR. FINE SAND, LITTLE SILT |
| 105 | | | | | | | | | | | | 105'0" | |
| | | 13 | D | 18" | 13" | 106'6" | 22 | 20 | 28 | | | | |
| 110 | | | | | | | | | | | VERY DENSE MOIST | | BR. FINE SAND, SILT, AND MEDIUM TO FINE GRAVEL (cemented) TILL |
| | | | | sampler refused at 110'0" | | | | | | | | | |
| | | | | cored for penetration thru till | | | | | | | | | |
| | | | C | | | | | | | | | 114'0" | |
| 115 | | | C | | | | | | | 4 | | | RUN 1 114' to 119' |
| | | | C | | | | | | | 6 | MEDIUM HARD | | RECOVERED |
| | | | C | | | | | | | 9 | | | |
| | | | C | | | | | | | 13 | | | GRAY SHALE 10" |
| 120 | | | C | | | | | | | 8 | | 119'0" | |
| | | | C | | | | | | | | | | END OF HOLE 119'0" |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT. HOLE NO. 81

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

X

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 3<br>HOLE NO. 82 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT 7 FT. AFTER 24 HOURS
AT 7 FT. AFTER 48 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/15 Date Fin. 11/17/60
SURFACE ELEV. 39.3
GROUND WATER ELEV.

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 8 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| 5 | 12 | | | | | 4' to | 2 | 2 | 2 | | | | cinders, sand |
| | 14 | | | | | 5'6" | | | | | | | |
| | 12 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | 9'0" | |
| 10 | 15 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | fine to medium sand, silt, some decayed material |
| | 10 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | 14'0" | |
| 15 | 6 | | | | | 15' to | | | | | | | |
| | 5 | | | | | 16'6" | 1 | 1 | 1 | | | | silt, clay, little fine sand. |
| | 6 | | | | | | | | | | | | |
| | 5 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | |
| 20 | 8 | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| 25 | 12 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| | 18 | | | | | | | | | | | | |
| | 20 | | | | | 30' to | | | | | | | |
| 30 | 18 | | | | | 31'6" | 1 | 1 | 1 | | | | |
| | 14 | | | | | | | | | | | | |
| | 16 | | | | | | | | | | | | |
| | 19 | | | | | | | | | | | | |
| 35 | 19 | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | |
| | 19 | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | |
| | 19 | | | | | | | | | | | | |
| 40 | 22 | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 82

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 2 OF 3<br>HOLE NO. 82 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | CASING / SAMPLER / CORE BAR.<br>TYPE<br>SIZE I.D. 2 1/2 / 1 3/8<br>HAMMER WT. 300 / 140<br>HAMMER FALL 24" / 30" / BIT. | Date Start ____ Date Fin. ____<br>SURFACE ELEV. 39.3<br>GROUND WATER ELEV. ____ |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 17 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| 45 | 12 | | | | | 45'0" to | | | | | | | |
| | 14 | | SS | | | 46'6" | 1 | 1 | 1 | | | | |
| | 12 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| 50 | 14 | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| 55 | 15 | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 16 | | | | | | | | | | | | |
| | 18 | | | | | 60'0" to | | | | | | | |
| 60 | 19 | | SS | | | 61'6" | 1 | 1 | 1 | | | | |
| | 19 | | | | | | | | | | | | |
| | 20 | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | |
| 65 | 21 | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | |
| | 22 | | | | | | | | | | | | |
| | 21 | | | | | | | | | | | 69'0" | |
| 70 | 20 | | | | | 70'0" to | | | | | | | |
| | 27 | | | | | 71'6" | 6 | 4 | 6 | | | | fine sand, silt |
| | 28 | | | | | | | | | | | | |
| | 31 | | | | | | | | | | | | |
| | 29 | | | | | | | | | | | 74'0" | |
| 75 | 32 | | | | | 74'0" to | 28 | 33 | 36 | | | | |
| | 54 | | | | | 75'6" | | | | | | | medium to coarse sand, some silt, gravel, cobbles |
| | 58 | | | | | | | | | | | | |
| | 51 | | | | | | | | | | | | |
| | 36 | | | | | | | | | | | | |
| 80 | 34 | | | | | 80'0" to 81'6" | 24 | 39 | 32 | | | | |

GROUND SURFACE TO ____ FT., ____ USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 82

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 3 OF 3<br>HOLE NO. 82 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT 7' FT. AFTER 24 HOURS<br>AT 7' FT. AFTER 48 HOURS | CASING / SAMPLER / CORE BAR.<br>TYPE<br>SIZE I.D. 2 1/2 / 1 3/8<br>HAMMER WT. 300 / 140<br>HAMMER FALL 24" / 30"<br>BIT. | Date Start 11/15 Date Fin. 11/17/60<br>SURFACE ELEV. 39.3<br>GROUND WATER ELEV. |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 85 | 47 | | | | | | | | | | | | |
| | 49 | | | | | | | | | | | | |
| | 56 | | | | | | | | | | | | |
| | 71 | | | | | | | | | | | | |
| | 72 | | | | | 85' to | | | | | | | |
| | 68 | | SS | | | 86'6" | 49 | 54 | 56 | | | | |
| | 52 | | | | | | | | | | | 87'0" | |
| | 51 | | | | | 87' to | | | | | | | |
| | 53 | | | | | 88'6" | 31 | 38 | | | | | |
| 90 | 57 | | | | | 90' to | | | | | | | medium to fine sand and silt |
| | 48 | | | | | 91'6" | 12 | 28 | 39 | | | | |
| | 47 | | | | | | | | | | | | |
| | 61 | | | | | | | | | | | | |
| | 58 | | | | | | | | | | | 94'6" | |
| 95 | 73 | | | | | 95' to | | | | | | | |
| | | | | | | 96'6" | | | | | | | medium sand, some silt, gravel, cobbles |
| 100 | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | |
| | | | | | | | | | | | | 110'0" | |
| 110 | | | | | | | | | | 15 | | | rock, red shale, fractured 6'run, 24" recovery |
| | | | | | | | | | | 20 | | | |
| | | | | | | | | | | 20 | | | |
| | | | | | | | | | | 18 | | | |
| 115 | | | | | | | | | | 20 | | | |
| | | | | | | | | | | 20 | | 116'0" | |
| | | | | | | | | | | | | | bottom of boring |
| 120 | | | | | | | | | | | | | |

GROUND SURFACE TO _____ FT., USED _____ " CASING THEN _____ " CASING TO _____ FT.

HOLE NO. 82

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION
Sheet One of Three

HOLE NO. B.C. 9
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn. DATE, START 2/2/60 GND. ELEV. 33.0 M.S.L.
PED. CLASS. _____ DATE, FINISH 2/4/60 G. W. DEPTH 11'0"

CASING O.D. 3" I.D. 2½" WEIGHT OF HAMMER 300 & 140 lbs. HAMMER FALL
SAMPLER O.D. 2" I.D. 1-3/8" INSIDE LENGTH OF SAMPLER 20" CASING 24" SAMPLER 30"

| DEPTH BELOW GND. SURF. | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 6/12 12/18 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 | 10 | 40 | 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 3 | 1 | 1'0" - 2'6" 1 1 2 | | | | | | | | Brown fine sand, some silt |
| | 9 | | 3 14" | Rec. | | | | | | | 0'0" - 5'0" |
| | 8 | | | | M | BROWN | | | | | |
| | 7 | 5 | 5'0" - 6'6" | | | | | | | | |
| | 3 | 2 | 1 2 | | | | | | | | |
| | 4 | | 2 12" | Rec. | | | | | | | Brown Silt, some clay, with fine sand layers |
| | 4 | | | | | | | | | | |
| 10 | 4 | | | | | | | | | | 5' - 24'0" |
| | 5 | 10 | 10'0" - 11'6" | | | | | | | | |
| | 4 | 3 | 1 1 | | | | | | | | |
| | 4 | | 1 18" | Rec. | | | | | | | |
| | 4 | | | | | | | | | | |
| | 4 | | | | | | | | | | |
| | 4 | 15 | 15'0" - 16'6" | | | | | | | | |
| | 3 | 4 | 1 1 | | | | | | | | |
| | 4 | | 1 18" | Rec. | | | | | | | |
| | 4 | | | | | | | | | | |
| | 5 | | | | M | BROWN | | | | | |
| | 5 | | | | | | | | | | |
| 20 | 6 | 20 | 20'0" - 21'6" | | | | | | | | |
| | 4 | 5 | 1 1 | | | | | | | | |
| | 5 | | 1 18" | Rec. | | | | | | | |
| | 5 | | | | | | | | | | |
| | 6 | | | | | | | | | | |
| | 6 | 25 | 25'0" - 26'6" | | | | | | | | |
| | 6 | 6 | 1 1 | | | | | | | | |
| | 6 | | 1 18" | Rec. | | | | | | | Reddish Brown Silt, Some Clay |
| | 7 | | | | | | | | | | |
| | 8 | | | | | | | | | | |
| 30 | 9 | 30 | 30'0" - 31'6" | | | | | | | | 24'0" - 59'0" |
| | 6 | 7 | 1 1 | | | | | | | | |
| | 7 | | 1 18" | Rec. | | | | | | | |
| | 8 | | | | | | | | | | |
| | 8 | | | | | REDDISH | | | | | |
| | 9 | 35 | 35'0" - 36'6" | | M | BROWN | | | | | |
| | 7 | 8 | 1 1 | | | | | | | | |
| | 8 | | 1 18" | Rec. | | | | | | | |
| | 9 | | | | | | | | | | |
| | 9 | | | | | | | | | | |
| 40 | 10 | 40 | 40'0" - 41'6" | | | | | | | | |
| | 8 | 9 | 1 1 | | | | | | | | |
| | 10 | | 1 18" | Rec. | | | | | | | |
| | 10 | | | | | | | | | | |
| | 11 | | | | | | | | | | |
| | 12 | 45 | 45' - 46'6" | | | | | | | | |
| | 11 | 10 | 1 1 | | | | | | | | |
| | 12 | | 2 18" | Rec. | | | | | | | |
| | 13 | | | | | | | | | | |
| | 13 | | | | | | | | | | |
| 50 | 14 | | | | | | | | | | |

DRILLING INSPECTOR H. D. STUBING ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. B.C. 9

Form No. 15

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION
Sheet Two of Three

HOLE NO. F.C. 9
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn. DATE, START _____ GND. ELEV. _____
PED. CLASS. _____ DATE, FINISH _____ G. W. DEPTH _____

CASING O.D. _____ I.D. _____
SAMPLER O.D. _____ I.D. _____
WEIGHT OF HAMMER _____
INSIDE LENGTH OF SAMPLER _____
HAMMER FALL CASING _____ SAMPLER _____

| DEPTH BELOW GND. SURF. | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 | 6/12 | 12/18 | 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 | 10 | 40 | 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 10 | 11 | 1 | 2 | | | | | | | | | | |
| | 13 | | | | 2 | 18" | | Rec. | | | | | | Reddish Brown Silt, Some Clay |
| | 14 | | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | | |
| | 16 | 55'0" | – | | 56'6" | | | M | REDDISH BROWN | | | | | |
| | 16 | 12 | 1 | 2 | | | | | | | | | | |
| | 18 | | | | 2 | 18" | | Rec. | | | | | | |
| | 21 | | | | | | | | | | | | | |
| | 23 | | | | | | | | | | | | | |
| 10 | 26 | 60'0" | – | | 61'6" | | | | | | | | | |
| | 27 | 13 | 2 | 3 | | | | | | | | | | Reddish Brown Silt, Trace of Very Fine Sand |
| | 39 | | | | 4 | 18" | | Rec. | | | | | | |
| | 41 | | | | | | | | | | | | | 59'0" – 68'0" |
| | 27 | | | | | | | | | | | | | |
| | 36 | 65'0" | – | | 66'6" | | | M | REDDISH BROWN | | | | | |
| | 29 | 14 | 3 | 4 | | | | | | | | | | |
| | 36 | | | | | | | | | | | | | |
| | 37 | | | | | | | | | | | | | |
| | 42 | | | | | | | | | | | | | |
| 20 | 43 | 70'0" | – | | 71'6" | | | | | | | | | |
| | 36 | 15 | 6 | 8 | | | | | | | | | | Reddish Brown c/f sand, Some Silt, Trace of Gravel |
| | 34 | | | | 11 | 12" | | Rec. | | | | | | |
| | 41 | | | | | | | | | | | | | |
| | 38 | | | | | | | | | | | | | 68'0" – 95'0" |
| | 42 | 75'0" | – | | 76'6" | | | | | | | | | |
| | 37 | 16 | 6 | 10 | | | | | | | | | | |
| | 39 | | | | 14 | 13" | | Rec. | | | | | | |
| | 41 | | | | | | | | | | | | | |
| | 42 | | | | | | | | | | | | | |
| 30 | 48 | 80'0" | – | | 81'6" | | | | | | | | | |
| | 47 | 17 | 11 | 13 | | | | | | | | | | |
| | 49 | | | | 13 | 12" | | Rec. | | | | | | |
| | 50 | | | | | | | | | | | | | |
| | 55 | | | | | | | M | REDDISH BROWN | | | | | |
| | 59 | 85'0" | – | | 86'6" | | | | | | | | | |
| | 49 | 18 | 11 | 12 | | | | | | | | | | |
| | 58 | | | | 14 | 12" | | Rec. | | | | | | |
| | 71 | | | | | | | | | | | | | |
| | 78 | | | | | | | | | | | | | |
| 40 | 96 | 90'0" | – | | 91'6" | | | | | | | | | |
| | 54 | 19 | 33 | 24 | | | | | | | | | | |
| | 86 | | | | 36 | 12" | | Rec. | | | | | | |
| | 197 | | | | | | | | | | | | | |
| | 201 | | | | | | | | | | | | | |
| | 254 | 95'0" | – | | 96'6" | | | | | | | | | |
| | 69 | 20 | 17 | 21 | | | | | | | | | | |
| | 75 | | | | 29 | 15" | | Rec. | | | | | | REDDISH Brown Fine Sand, A Little Silt |
| | 92 | | | | | | | | | | | | | |
| | 95 | | | | | | | M | REDDISH BROWN | | | | | |
| 50 | 124 | | | | | | | | | | | | | |

DRILLING INSPECTOR _____ ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. F.C. 9

Form No. 15

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION
Sheet three of three

HOLE NO. F. C. 9
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn. DATE, START 2/2/60 GND. ELEV. _____
PED. CLASS. _____ DATE, FINISH 2/4/60 G. W. DEPTH _____

CASING O.D. _____ I.D. _____
SAMPLER O.D. _____ I.D. _____
WEIGHT OF HAMMER _____
INSIDE LENGTH OF SAMPLER _____
HAMMER FALL CASING ___ SAMPLER ___

| DEPTH BELOW GND. SURF. | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 6/12 12/18 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 | 10 | 40 | 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | ~~139~~ ~~171~~ ~~209~~ ~~314~~ ~~500~~ for 6" | | ~~21~~ ~~30~~ 44 18" | Rec. | X | REDDISH BROWN | | | | | Reddish Brown, Silt, Some C/f Sand, & Little Gravel 100'0" - 104'6" |
| | | | | | | | | 1½ hrs. drilling time | | | DRILLED ROCK: Run #1 - 104'6" - 109'6" 3'11" Rec 21 Pieces & Frag. Red Shale |
| 10 | | | | | | | | 1½ hrs. drilling time | | | Run #2 - 109'6" - 114'6" 3'0" Rec. 10 Pieces & Frag. Red Shale |
| | | | | | | | | | | | HOLE COMPLETED AT 114'6" |
| | | | | | | | | | | | DRILLER: D. GRAHAMER |
| 20 | | | | | | | | | | | |
| 30 | | | | | | | | | | | |
| 40 | | | | | | | | | | | |
| 50 | | | | | | | | | | | |

DRILLING INSPECTOR _____ ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. F. C. 9

Form No. 15

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 2<br>HOLE NO. 83 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT 1.5 FT. AFTER 24 HOURS<br>AT ____ FT. AFTER ____ HOURS | CASING / SAMPLER / CORE BAR.<br>TYPE<br>SIZE I.D.<br>HAMMER WT.<br>HAMMER FALL<br>BIT. | Date Start 11/14 Date Fin. 11/15/60<br>SURFACE ELEV. 40.7<br>GROUND WATER ELEV. 39.7 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 12 | | | | | | | | | | | 1'-6" | Loam |
| | 17 | | | | | | | | | | | | |
| | 21 | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | | |
| 5 | 24 | | ss | | 4' | to 5' | 6 | 6 | 8 | | | 5'0" | fine sand, some silt |
| | 17 | | ss | | 5' | to 5'6" | | | | | | | |
| | 14 | | | | | | | | | | | | silt, little fine sand, clay |
| | 14 | | | | | | | | | | | | |
| | 17 | | | | | | | | | | | 9'6" | |
| | 19 | | ss | | | 10' to 11'6" | 1 | 2 | 1 | | | | |
| 10 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | silt and clay |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 25 | | | ss | | | 25' to 26'6" | 2 | 1 | 1 | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 83

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY. CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 2 OF 2<br>HOLE NO. 83 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | TYPE / SIZE I.D. / HAMMER WT. / HAMMER FALL — CASING / SAMPLER / CORE BAR. / BIT. | Date Start 11/14 Date Fin. 11/15/60<br>SURFACE ELEV. 401.7<br>GROUND WATER ELEV. |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | | | SS | | | 45' to 46'6" | 2 | 2 | 2 | | | | silt and clay |
| 50 | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | |
| 60 | | | | | | 60' to 60'6" | 3 | | | | | 60'0" | |
| | | | | | | 60'6" to 61'6" | 4 | 8 | | | | | fine sand, silt |
| | | | | | | | | | | | | 64'0" | |
| 65 | | | | | | 64' to 65'6" | 37 | 39 | 28 | | | | medium to coarse sand, silt, gravel, cobbles |
| 70 | | | | | | 70' to 71'6" | 41 | 38 | 58 | | | | |
| 75 | | | | | | 75' to 76'6" | 48 | 52 | 49 | | | | |
| 80 | | | | | | 80' to 81'6" | 51 | 72 | 56 | | | 81'6" | |

GROUND SURFACE TO ____ FT., ____ " USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 83

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY. CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 3<br>HOLE NO. 84 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT 25 FT. AFTER 24 HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/11 Date Fin. 11/14/60
SURFACE ELEV. 44.6
GROUND WATER ELEV. 41.6

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | | | | | | | | | | | | |
| | 25 | | | | | | | | | | | | f i l l |
| | 22 | | | | | | | | | | | 3'0" | |
| | 24 | | | | | | | | | | | | |
| 5 | 21 | | | | | 4'to | | | | | | | |
| | 22 | | | | | 5'6" | 8 | 12 | 15 | | | | silt, little fine sand |
| | 24 | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | | |
| | 23 | | | | | | | | | | | | |
| 10 | 22 | | | | | 10'to | | | | | | | |
| | | | | | | 11'6" | 3 | 3 | 3 | | | | |
| | | | | | | | | | | | | 14'0" | |
| 15 | | | | | | 15'to | | | | | | | |
| | | | | | | 16'6" | 2 | 2 | 2 | | | | |
| | | | | | | | | | | | | | clay, silt, little fine sand |
| 20 | | | | | | 20'to | | | | | | | |
| | | | | | | 21'6" | 1 | 1 | 2 | | | | |
| 25 | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | |
| 35 | | | | | | 35'to | | | | | | | |
| | | | | | | 36'6" | 1 | 2 | 1 | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT. USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 84

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 2 OF 3<br>HOLE NO. 84 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT 25 FT. AFTER 24 HOURS<br>AT ____ FT. AFTER ____ HOURS | CASING / SAMPLER / CORE BAR.<br>TYPE<br>SIZE I.D. 2 1/2 / 1 3/8<br>HAMMER WT. 300 / 140<br>HAMMER FALL 24" / 30"<br>BIT. | Date Start 11/11 Date Fin. 11/14/60<br>SURFACE ELEV. 44.6<br>GROUND WATER ELEV. ~~44.6~~ |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | | | | | | | | | | | | | |
| 50 | | | | | | 50' to 51'6" | 1 | 1 | 1 | | | | |
| 55 | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | |
| | | | | | | 63' to 64'6" | 4 | 8 | 9 | | | 63'0" | |
| | | | | | | | | | | | | 64'6" | fine sand, silt |
| 65 | | | | | | 64'6" to 66' | 12 | 16 | 18 | | | | |
| | | | | | | 67' to 68'6" | 18 | 32 | 36 | | | | medium to coarse sand, silt, and gravel |
| 70 | | | | | | | | | | | | | |
| 75 | | | | | | 75' to 76'6" | 38 | 36 | 53 | | | | |
| 80 | | | | | | 80' to 81'6" | 37 | 54 | 39 | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 84

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| | | |
|---|---|---|
| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 3 OF 3<br>HOLE NO. 84 |
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT 25 FT. AFTER 24 HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24" | 30" | |

Date Start 11/11 Date Fin. 11/14/60
SURFACE ELEV. 444.6
GROUND WATER ELEV. 444.6

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 85 | | | | | | 87' to 88'6" | 47 | 54 | 58 | | | | medium to coarse sand, silt, and gravel |
| | | | | | | | | | | | | 88'6" | bottom of boring |
| 90 | | | | | | | | | | | | | |
| 95 | | | | | | | | | | | | | |
| 100 | | | | | | | | | | | | | |
| 105 | | | | | | | | | | | | | |
| 110 | | | | | | | | | | | | | |
| 115 | | | | | | | | | | | | | |
| 120 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____" CASING THEN ____" CASING TO ____ FT.

HOLE NO. 84

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION
Sheet One of Two

HOLE NO. F. C. 10
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn DATE, START 2/2/60 GND. ELEV. 38.2 M.S.L.
PED. CLASS. _____ DATE, FINISH 2/4/60 G. W. DEPTH 10'4"

CASING O.D. 3" I.D. 2½" WEIGHT OF HAMMER 300 & 140 lbs. HAMMER FALL
SAMPLER O.D. 2" I.D. 1 3/8" INSIDE LENGTH OF SAMPLER 20" CASING ___ SAMPLER ___

| DEPTH BELOW GND. SURF | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 | 6/12 | 12/18 | 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 | 10 | 40 | 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | | | | | | | | | | | | | |
| | 4 | 1 | 1 | 2 | | | | | | | | | | Gray Silty Clay |
| | 3 | | | | 6 | 17" | Rec. | | | | | | | 1'0" - 10' 0" |
| | 4 | | | | | | | | | | | | | |
| | 4 | | | | | | | | | | | | | |
| | 3 | 2 | 2 | 3 | | | | | | | | | | |
| | 9 | | | | 3 | 18" | Rec. | | | | | | | |
| | 7 | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | |
| 10 | 10 | | | | | | | | | | | | | |
| | 12 | 3 | 1 | 1 | | 18" | Rec. | | | | | | | |
| | 14 | | | | 1 | | | | | | | | | Gray Clay |
| | 18 | | | | | | | | | | | | | |
| | 18 | | | | | | | | GRAY | | | | | 10'0" - 30'0" |
| | 19 | | | | | | | | | | | | | |
| | 12 | 4 | 1 | 2 | | | | | | | | | | |
| | 13 | | | | 1 | 18" | Rec. | | | | | | | |
| | 12 | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | |
| 20 | 10 | | | | | | | | | | | | | |
| | 10 | 5 | 1 | 1 | | | | | | | | | | |
| | 11 | | | | 1 | 18" | Rec. | | | | | | | |
| | 16 | | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | | |
| | 16 | 6 | 0 | 1 | | | | M | | | | | | |
| | 17 | | | | 1 | 18" | Rec. | | | | | | | |
| | 16 | | | | | | | | | | | | | |
| | 15 | | | | | | | | | | | | | |
| 30 | 17 | | | | | | | | | | | | | |
| | 14 | 7 | 0 | 1 | | | | | | | | | | |
| | 17 | | | | 1 | 18" | Rec. | | | | | | | Red Gray Clay |
| | 16 | | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | | 30'0" - 50'0" |
| | 15 | | | | | | | | | | | | | |
| | 18 | 8 | 1 | 1 | | | | | | | | | | |
| | 22 | | | | 1 | 18" | Rec. | | | | | | | |
| | 19 | | | | | | | | | | | | | |
| | 17 | | | | | | | | | | | | | |
| 40 | 19 | | | | | | | | RED & GRAY | | | | | |
| | 18 | 9 | 1 | 2 | | | | | | | | | | |
| | 20 | | | | 1 | 14" | Rec. | | | | | | | |
| | 21 | | | | | | | | | | | | | |
| | 23 | | | | | | | | | | | | | |
| | 23 | | | | | | | | | | | | | |
| | 20 | 10 | 1 | 2 | | | | | | | | | | |
| | 23 | | | | 2 | 16" | Rec. | | | | | | | |
| | 21 | | | | | | | | | | | | | |
| | 23 | | | | | | | | | | | | | |
| 50 | 25 | | | | | | | | | | | | | |

DRILLING INSPECTOR H. D. TUBING ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. F. C. 10

Form No. 15

DISTRICT NO. _____
COUNTY _____
B.S.M. PROJ. NO. _____

GILES DRILLING CORP.
2 PARK AVENUE
NEW YORK 16, N. Y.
SUBSURFACE INFORMATION
Sheet Two of Two

HOLE NO. F. C. 10
LINE & STA. _____
OFFSET _____

NAME Greater Hartford Flood Commission NO. _____
QUAD. LOCATION Hartford, Conn DATE, START 2/2/60 GND. ELEV. _____
PED. CLASS. _____ DATE, FINISH 2/4/60 G. W. DEPTH _____

CASING O.D. _____ I.D. _____ WEIGHT OF HAMMER _____ HAMMER FALL
SAMPLER O.D. _____ I.D. _____ INSIDE LENGTH OF SAMPLER _____ CASING ____ SAMPLER ____

| DEPTH BELOW GND. SURF | BLOWS ON CASING | SAMPLE NO. | BLOWS ON SAMPLER 0/6 | 6/12 | 12/18 | 18/24 | CROSS SECTION | MOISTURE | COLOR | MECH. ANALYSIS % PASSING SIEVE NO. 4 | 10 | 40 | 200 | FIELD IDENTIFICATION OF SOIL & REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 25 | 11 | 2 | 3 | | | | | | | | | | Brown Sand, Gravel |
| | 26 | | | | 2 | 18" | Rec. | | | | | | | |
| | 28 | | | | | | | | | | | | | 50'0" - 84'4" |
| | 37 | | | | | | | | | | | | | |
| | 41 | | | | | | | | | | | | | |
| | 47 | 12 | Missed | | | | | | | | | | | Missed Sample #12 |
| | 20 | | | | | | | | | | | | | |
| | 18 | | | | | | | | | | | | | |
| | 23 | | | | | | | | | | | | | Sample #13 Wash Sample |
| | 24 | | | | | | | | | | | | | |
| 10 | 31 | 13 | 47 | 10 | | | | | | | | | | |
| | 37 | | | | 10 | | | | | | | | | |
| | 41 | | | | | | | M | RED | | | | | |
| | 39 | | | | | | | | | | | | | |
| | 42 | | | | | | | | | | | | | |
| | 38 | 14 | 78 | | | 16" | Rec. | | | | | | | |
| | 38 | 14A | | 18 | 20 | | | | | | | | | |
| | 41 | | | | | | | | | | | | | |
| | 46 | | | | | | | | | | | | | |
| | 51 | | | | | | | | | | | | | |
| 20 | 44 | 15 | 24 | 18 | | 18" | Rec. | | | | | | | |
| | 47 | | | | | | | | | | | | | |
| | 43 | | | | | | | | | | | | | |
| | 49 | | | | | | | | | | | | | |
| | 50 | | | | | | | | | | | | | |
| | 47 | 16 | 41 | 34 | | 14" | Rec. | | | | | | | |
| | 41 | | | | | | | | | | | | | |
| | 52 | | | | | | | | | | | | | |
| | 53 | | | | | | | | | | | | | |
| | 44 | | | | | | | | | | | | | |
| 30 | 46 | 17 | 31 | 42 | | 15" | Rec. | | | | | | | |
| | 45 | | | | | | | | | | | | | |
| | 204 | | | | | | | | | | | | | |
| | 303 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | DRILLED ROCK: |
| | | | | | | | | | | | | | | 1st Run - 84'4" - 87'4" - 17" Rec. |
| | | | | | | | | | | | | | | 2nd Run - 87'4" - 92'4" 41" Rec. 45 min. |
| 40 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | HOLE COMPLETED AT 92'4" |
| | | | | | | | | | | | | | | DRILLER: R. E. YOUNG |
| | | | | | | | | | | | | | | |
| 50 | | | | | | | | | | | | | | |

DRILLING INSPECTOR _____ ASS'T SOILS ENGINEER _____

SAMPLES SHOULD BE TAKEN AT APPROXIMATELY 5 FT. INTERVALS AND WHEREVER THERE IS AN INDICATION OF POSSIBLE CHANGE OF STRATA. CLEAN TO END OF CASING AND TAKE ALL SAMPLES "DRY" WITH SAMPLER BELOW END OF CASING. DO NOT DRIVE THE SAMPLER FARTHER THAN ITS INSIDE LENGTH WITHOUT CLEANING. LOCATION OF LAYER BOUNDARIES MUST BE SHOWN IN "CROSS SECTION" COLUMN. SAMPLES SHOULD BE VISUALLY IDENTIFIED. MOISTURE CONTENT SHOULD BE INDICATED IN "MOISTURE" COLUMN AS W-WET, M-MOIST, OR D-DRY. ANY LOSS OF WASH WATER OR UPWARD FLOW OF WATER AND MATERIAL INTO CASING SHOULD BE EMPHASIZED UNDER "REMARKS".

HOLE NO. F. C. 10

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Htfd. Flood Comm. | SHEET 1 OF 2<br>HOLE NO. 85 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT 2' FT. AFTER 24 HOURS<br>AT ____ FT. AFTER ____ HOURS | CASING / SAMPLER / CORE BAR.<br>TYPE ____ / ____ / ____<br>SIZE I.D. 4" / 1 3/8 / ____<br>HAMMER WT. 300 / 140 / ____ BIT.<br>HAMMER FALL 24 / 30 / ____ | Date Start 11/16/60 Date Fin. 11/22/60<br>SURFACE ELEV. 36.0<br>GROUND WATER ELEV. 26.00 |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 8 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| 5 | 10 | | | | | 5' to | | | | | | | |
| | 12 | | SS | | | 6'6" | 1 | 2 | 1 | | | | fine sand , silt, some |
| | 10 | | | | | | | | | | | | organic material |
| | 12 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| 10 | 10 | | | | | 10' to | | | | | | | |
| | 12 | | | | | 11'6" | 3 | 2 | 2 | | | | |
| | 12 | | | | | | | | | | | 12'0" | |
| | 10 | | | | | 12' to | | | | | | | |
| | 9 | | | | | 13'6" | 1 | 1 | 1 | | | | |
| 15 | 10 | | | | | 15' to | | | | | | | |
| | 12 | | | | | 16'6" | 1 | 1 | 1 | | | | clay, silt, trace fine |
| | 14 | | | | | | | | | | | | sand |
| | 16 | | | | | | | | | | | | |
| | 16 | | | | | | | | | | | | |
| 20 | 18 | | | | | 20' to | | | | | | | |
| | 17 | | | | | 21' | 1 | 1 | 1 | | | 21'0" | SHELBY |
| | 16 | | | | | | | | | | | | |
| | 16 | | | | | | | | | | | 23'0" | |
| | 16 | | | | | | | | | | | | |
| 25 | 18 | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | 30'0" | |
| | | | | | | | | | | | | 32'0" | SHELBY |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | SS | | | 38'6" | / | / | / | | | | |
| | | | | | | 40'0" | | | | | | | |

GROUND SURFACE TO ____ FT., ____ USED ____" CASING THEN ____" CASING TO ____ FT. HOLE NO. 85

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Htfd. Flood Comm. | SHEET 2 OF 2<br>HOLE NO. 85 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |
| GROUND WATER OBSERVATIONS<br>AT ____ FT. AFTER ____ HOURS<br>AT ____ FT. AFTER ____ HOURS | CASING / SAMPLER / CORE BAR.<br>TYPE — / —<br>SIZE I.D. 4" / 1 3/8 / —<br>HAMMER WT. 300 / 140 / BIT.<br>HAMMER FALL 24 / 30 | Date Start 11/16 Date Fin 11/22/60<br>SURFACE ELEV. 102.0<br>GROUND WATER ELEV. ____ |

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | 42'0" | S H E L B Y |
| 45 5 | | | | | | | | | | | | | Clay and Silt |
| 50 10 | | | | | | | | | | | | | |
| 55 15 | | | | | | | | | | | | | |
| 60 20 | | | SS | | | 60' to 61'6" | 17 | 18 | 17 | | | 60'0" | |
| 65 25 | | | | | | 65' to 66'6" | 28 | 39 | 41 | | | | Fine to Medium Sand, Silt, and Gravel |
| 70 30 | | | | | | 70' to 71'6" | 21 | 20 | 24 | | | | |
| 75 35 | | | | | | 74'6" to 75' | | | | 70<br>15<br>10 | | 75'0" | |
| 80 40 | | | | | | | | | | 10<br>10 | n | 80'6" | Rock, Shale (red)<br>5'6" run; recovery 3'2" |
| | | | | | | | | | | 5 | | | bottom of boring |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT. HOLE NO. 85

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY, CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 1 OF 2<br>HOLE NO. 86 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT 4'6" FT. AFTER 48 HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24 | 30 | |

Date Start 11/22 Date Fin. 11/25/60
SURFACE ELEV. 37.00
GROUND WATER ELEV. [illegible]32.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | SAMPLE DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 10 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | loam, organic material, |
| | 12 | | | | | | | | | | | | |
| 5 | 10 | | | | | 5' to | | | | | | | fine to medium sand, silt |
| | 13 | | SS | | | 6'6" | 2 | 2 | 2 | | | | |
| | 18 | | | | | | | | | | | | |
| | 29 | | | | | | | | | | | | |
| | 30 | | | | | | | | | | | | |
| 10 | 31 | | SS | | | 10' | 1 | 1 | | | | | |
| | 31 | | | | | to 11" | | | | | | 11'0" | |
| | 28 | | | | | 11' to | 1 | | | | | | |
| | 29 | | | | | 11'6" | | | | | | | |
| | 31 | | | | | | | | | | | | clay, silt, trace fine sand |
| | 30 | | | | | 15' to | | | | | | | |
| 15 | 20 | | SS | | | 16'6" | 1 | 1 | 1 | | | | |
| | 19 | | | | | | | | | | | 17'0" | |
| | 14 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | 19'0" | shelby |
| 20 | 14 | | | | | | | | | | | | |
| | 13 | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | |
| 25 | 12 | | SS | | | 25' to | | | | | | | |
| | | | | | | 26'6" | 1 | 1 | 1 | | | | |
| | | | | | | | | | | | | 27'0" | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | 29'0" | shelby |
| 30 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

HOLE NO. 86

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

| ENGINEERING SERVICES INC.<br>2846 MAIN STREET<br>GLASTONBURY. CONN. | CLIENT: Greater Hartford Flood Comm. | SHEET 2 OF 2<br>HOLE NO. 86 |
|---|---|---|
| CONTRACTOR | PROJECT NO. 1960-3 | LINE |
| FOREMAN —DRILLER Miller | PROJECT NAME Park River Conduit Ext. | STATION |
| INSPECTOR Batterson | LOCATION Hartford, Conn. | OFFSET |

GROUND WATER OBSERVATIONS
AT ____ FT. AFTER ____ HOURS
AT ____ FT. AFTER ____ HOURS

| | CASING | SAMPLER | CORE BAR. |
|---|---|---|---|
| TYPE | | | |
| SIZE I.D. | 2 1/2 | 1 3/8 | |
| HAMMER WT. | 300 | 140 | BIT. |
| HAMMER FALL | 24 | 30 | |

Date Start 11/25 Date Fin. 11/25/60
SURFACE ELEV. 37.0
WATER ELEV. 32.5

| DEPTH | CASING BLOWS PER FOOT | SAMPLE NO. | SAMPLE TYPE | SAMPLE PEN. | SAMPLE REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER (FORCE ON TUBE) 0-6 | 6-12 | 12-18 | CORING TIME PER FT. (MIN.) | DENSITY OR CONSIST. MOIST. | STRATA CHANGE DEPTH ELEV. | FIELD IDENTIFICATION OF SOIL. REMARKS INCL. COLOR, LOSS OF WASH WATER, SEAMS IN ROCK, ETC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 5 | | | | | | | | | | | | | |
| 50 10 | | | SS | | | 50' to 51'6" | 12 | 13 | 12 | | | 49'0" | |
| 55 15 | | | SS | | | 55' to 56'6" | 14 | 15 | 14 | | | | fine to medium to coarse sand, silt, gravel, cobbles |
| 60 20 | | | SS | | | 60' to 61'6" | 15 | 18 | 20 | | | | |
| | | | | | | 61'6" to 68' | 34 | 89 | | | | | |
| 65 25 | | | | | | | | | | | | | |
| 70 30 | | | | | | | | | | | | | |
| 75 35 | | | | | | | | | | | | 76'0" | |
| | | | | | | | | | | | | | 6' run - rock recovery 2'6" |
| 80 40 | | | | | | | | | | | | 82'0" | |

GROUND SURFACE TO ____ FT., USED ____ " CASING THEN ____ " CASING TO ____ FT.

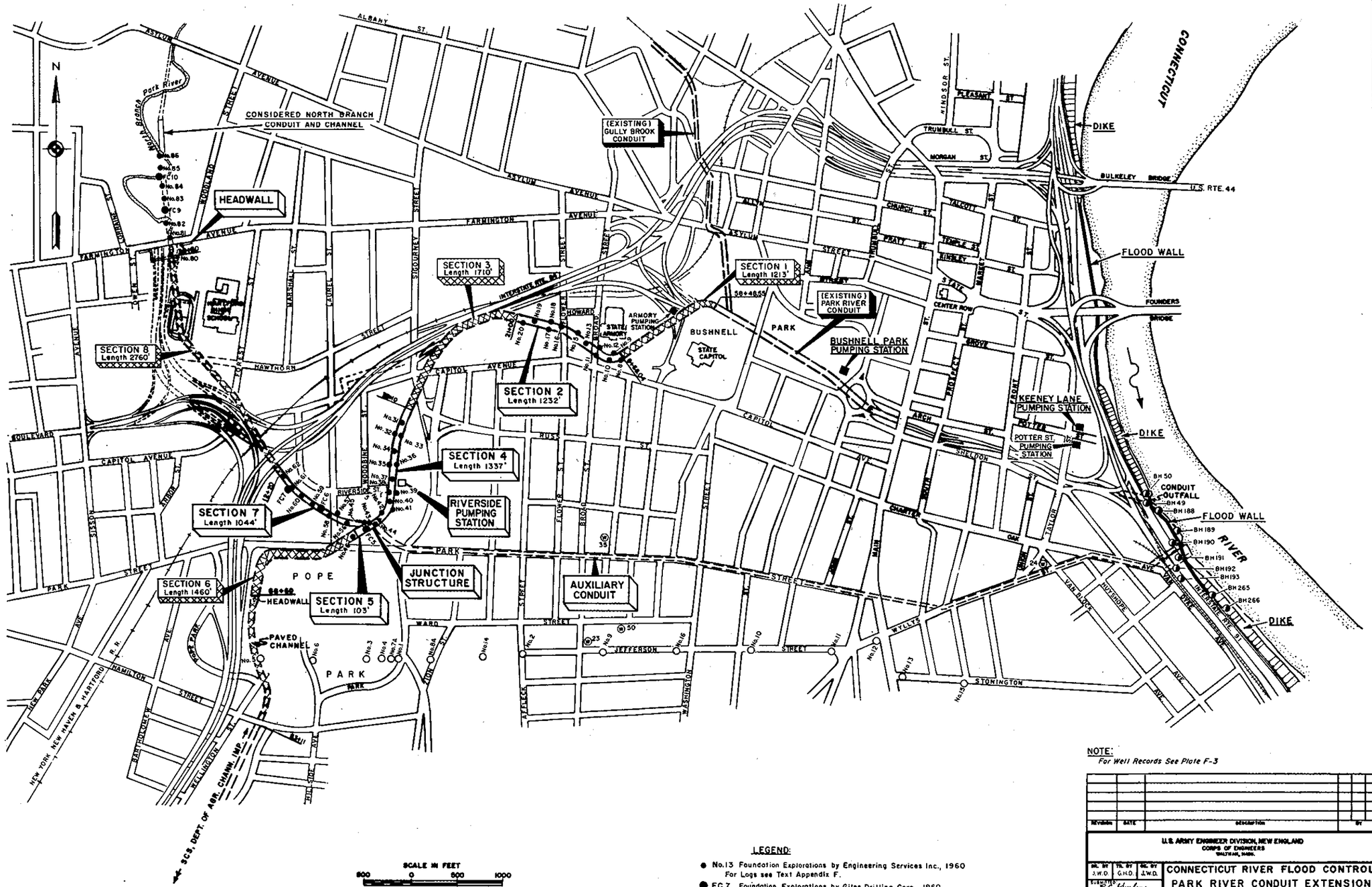
HOLE NO. 86

D = DRY W = WASHED C = CORED P = PIT A = AUGER UP = UNDISTURBED PISTON
UB = UNDISTURBED BALL CHECK T = THINWALL V = VANE TEST

PROPORTIONS USED: TRACE = 0-10%, LITTLE = 10-20%, SOME = 20-35%, AND = 35-50%

CORPS OF ENGINEERS

U. S. ARMY




NOTE:
*For Well Records See Plate F-3*

LEGEND:

- ● No.13 Foundation Explorations by Engineering Services Inc., 1960 For Logs see Text Appendix F.
- ● FC 7 Foundation Explorations by Giles Drilling Corp., 1960 For Logs see Text Appendix F.
- ○ No.16 Foundation Explorations by Philip J. Healy Inc., 1934 For Logs see Plate F-3.
- ◑ BH189 Foundation Explorations by Providence District, Army Engineers 1940 For Logs see Plate F-3.
- ⓦ50 Wells, Connecticut Water Resources Bulletin No. 4, 1964 "Records and Logs of Selected Wells and Test Borings."

| Revision | DATE | DESCRIPTION | BY |
|---|---|---|---|

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

| DR. BY J.W.D. | TR. BY G.H.D. | CK. BY J.W.D. |
|---|---|---|

SUBMITTED: R. C. Sanborn, CHIEF, ENGINEERING DIV.
RECOMMENDED: C. A. Gifford, CHIEF, PLANNING BRANCH
APPROVED: [illegible], CHIEF, HDRS & E BRANCH

# CONNECTICUT RIVER FLOOD CONTROL
## PARK RIVER CONDUIT EXTENSION AND AUXILIARY CONDUIT
## PLAN OF EXPLORATIONS
## PARK RIVER, CONNECTICUT

APPROVED: John Wanisetta, CHIEF ENGINEERING DIV. DATE JULY 1966

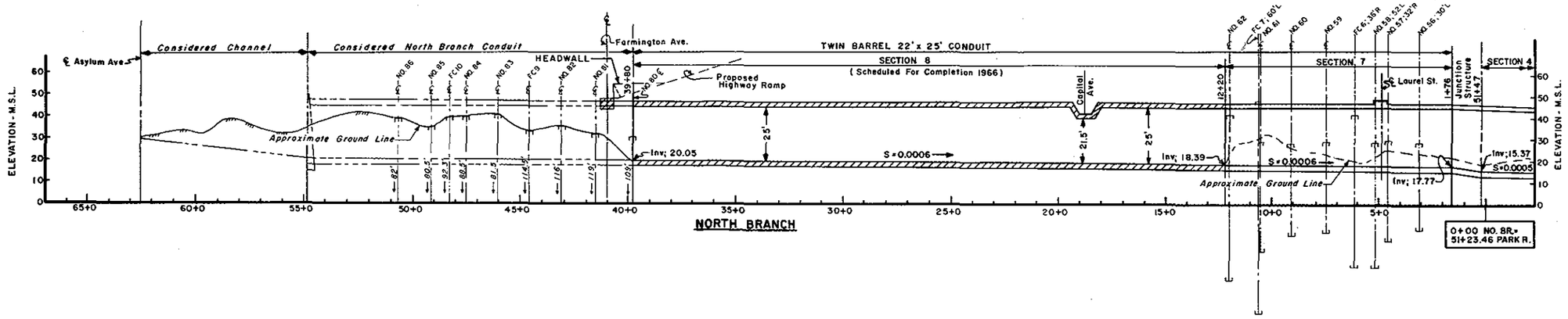
TO ACCOMPANY REPORT DATED 21 JULY 1966

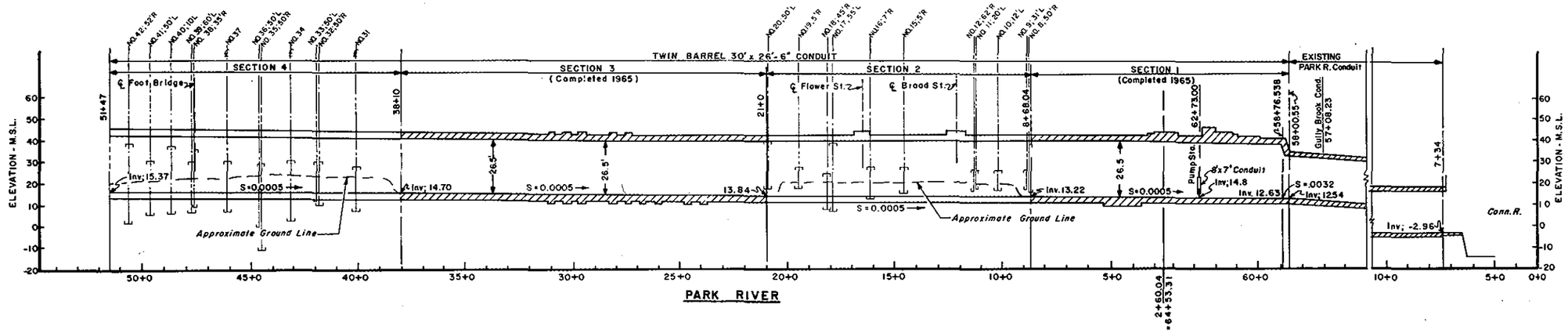
SCALE AS SHOWN

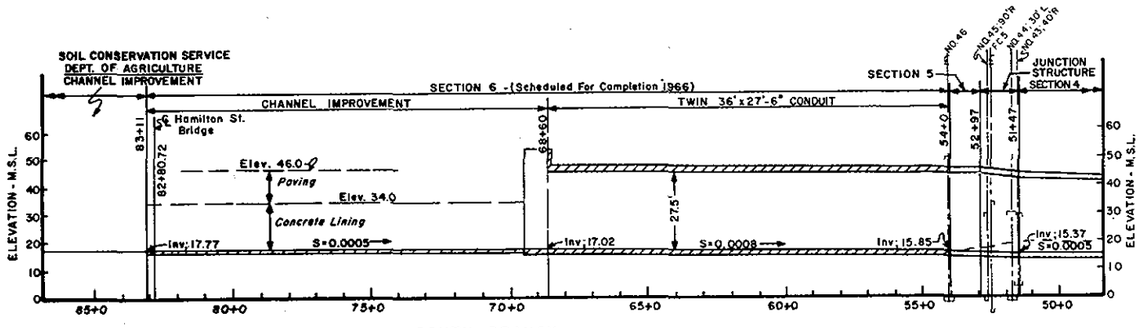
DRAWING NUMBER

SHEET 1 OF 4

PLATE F-1




LEGEND:

No. 6. Foundation Exploration by Engineering Services Inc.

FC 7. Foundation Exploration by Giles Drilling Corp.

Top of Boring.

Bottom of Boring

NOTE:

*For Logs of Exploration see attached sheets.*

*For Location of Profiles see Plan of Exploration, Plate F-1.*

| REVISION | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

| DESIGNED | DRAWN | CHECKED |
|---|---|---|
| J.W.O. | G.H.D. | J.W.O |

SUBMITTED: CHIEF, ENGINEERING BRANCH

CHIEF, T & D BRANCH

REVIEWED: PROJECT ENGINEER

APPROVED: CHIEF, PLANNING BRANCH

APPROVED: CHIEF, ENGINEERING DIVISION

CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER CONDUIT EXTENSION
PROFILES
PARK RIVER, CONNECTICUT
DATE JULY 1966

TO ACCOMPANY REPORT DATED: 21, JULY 1966

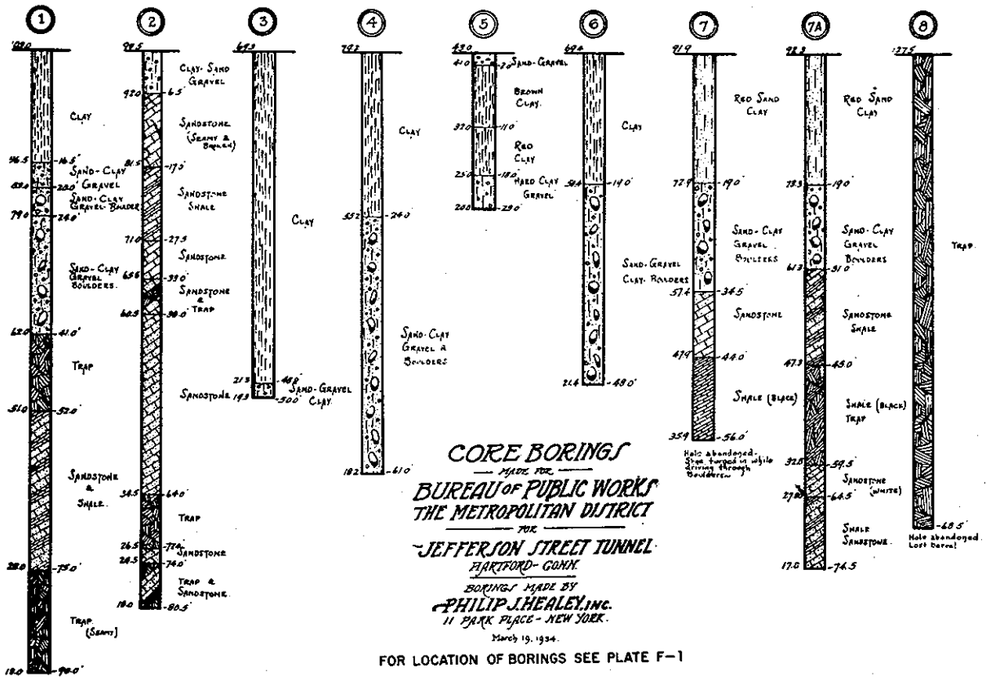
SCALE AS SHOWN

DRAWING NUMBER

SHEET 2 OF 4

PLATE F-2

CORPS OF ENGINEERS — U. S. ARMY




## CORE BORINGS

MADE FOR

## BUREAU OF PUBLIC WORKS THE METROPOLITAN DISTRICT

FOR

## JEFFERSON STREET TUNNEL HARTFORD - CONN.

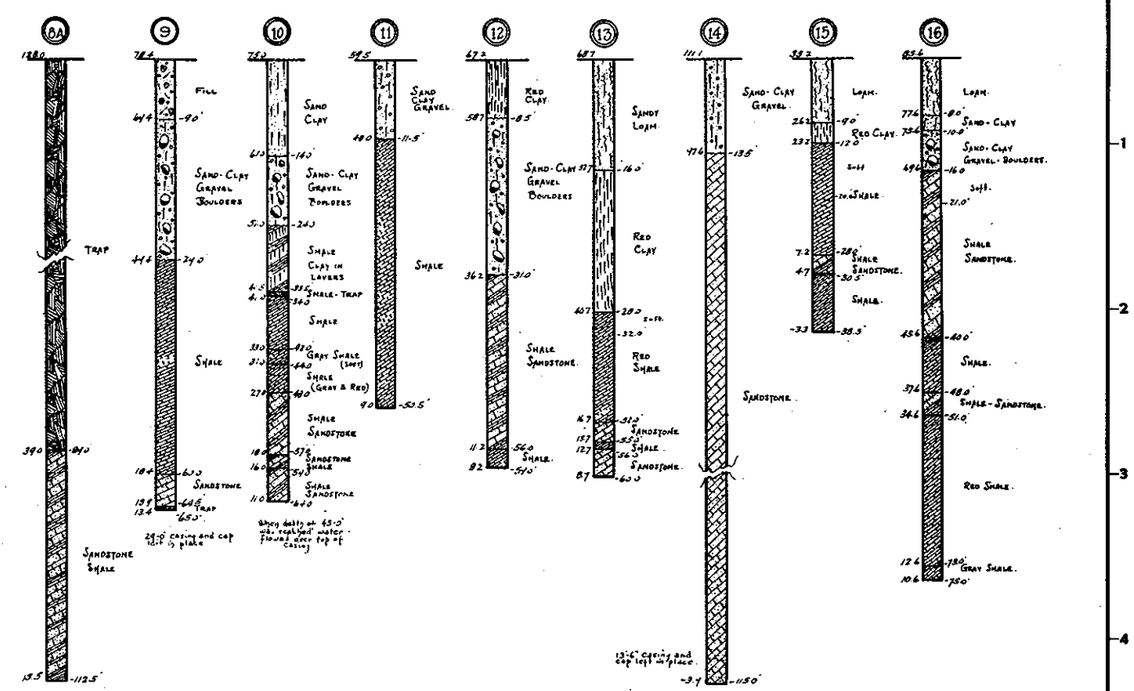
BORINGS MADE BY

PHILIP J. HEALEY, INC.

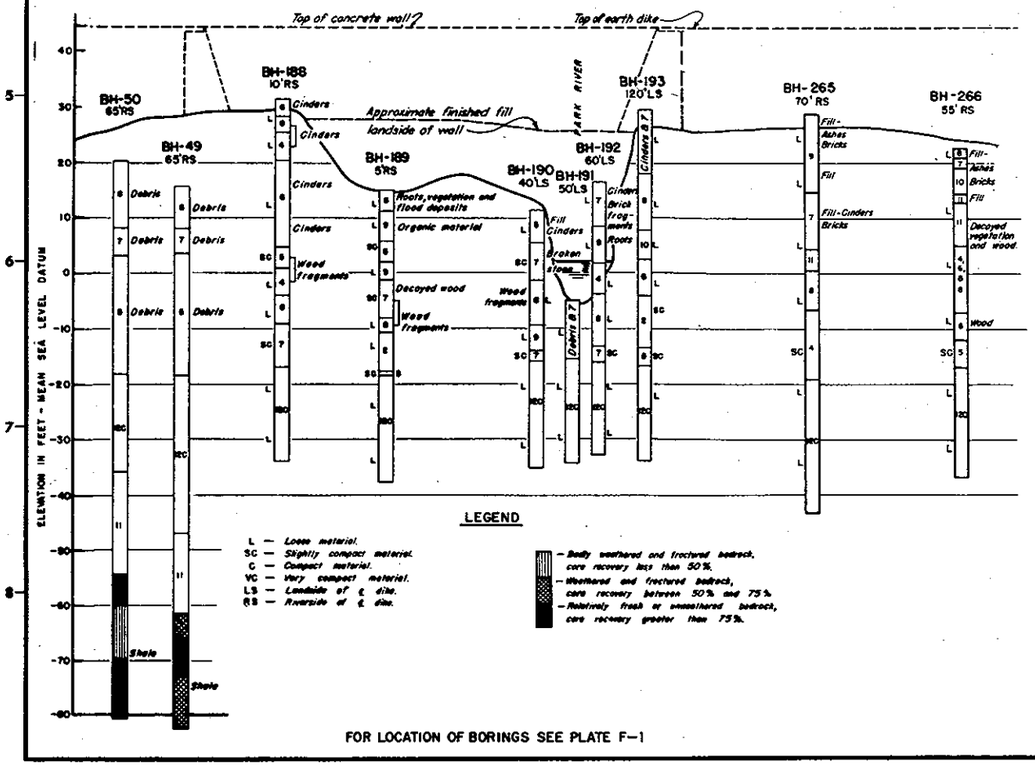
11 PARK PLACE - NEW YORK.

March 19, 1934.

FOR LOCATION OF BORINGS SEE PLATE F-1




FOR LOCATION OF BORINGS SEE PLATE F-1




LEGEND

FOR LOCATION OF BORINGS SEE PLATE F-1

### DESCRIPTION OF SOIL CLASSES

1. Graded from Gravel to Coarse Sand - Contains little medium sand.
2. Coarse to Medium Sand - Contains little gravel and fine sand.
3. Graded from Gravel to Medium Sand - Contains little fine sand.
4. Medium to Fine Sand - Contains little coarse sand and coarse silt
5. Graded from Gravel to Fine Sand - Contains little coarse silt.
6. Fine Sand to Coarse Silt - Contains little medium sand and medium silt.
7. Graded from Gravel to Coarse Silt - Contains little medium silt.
8. Coarse to Medium Silt - Contains little fine sand and fine silt.
9. Graded from Gravel to Medium Silt - Contains little fine silt.
10. Medium to Fine Silt - Contains little coarse silt and coarse clay. Possesses behavior characteristics of silt
- MC. Medium Silt to Coarse Clay - Contains little coarse silt and medium clay. Possesses behavior characteristics of clay.
11. Graded from Gravel or Coarse Sand to Fine Silt - Contains little coarse clay.
12. Fine Silt to Clay - Contains little medium silt and fine clay(colloids). Possesses behavior characteristics of silt
- 2C. Clay - Contains little silt Possesses behavior characteristics of clay.

### NOTES

*Compactness was determined by the number of blows required to drive 2" O.D. sample spoon one foot with 300 pound hammer dropped 18".*

*Class 12C indicated in bore hole records, generally occurs in alternating bands, having thin layers of fine clay interbedded with thicker layers of coarse to fine silt.*

### RECORDS OF WELLS

| WELL NO. | ELEV. MSL | DEPTH (FEET) | DIAMETER (INCHES) | DEPTH TO PRINCIPAL | | WATER LEVEL | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | BEDROCK (FEET) | WATER-BEARING MATERIAL | STATIC (FEET) | DATE | PUMPING (FEET) | YIELD GPM |
| 23 | 80 | 308 | 8 | 21 | Sandstone | - | - | - | 50 |
| 24 | 30 | 240 | 6 | 22 | " | - | - | - | 35 |
| 35 | 70 | 263 | 6 | 40 | " | FLOWS | - | - | 21 |
| 50 | 75 | 636 | 6 | 54 | " | 16 | 5/29/22 | 200 | 90 |

FOR LOCATION OF WELLS SEE PLATE F-1

### NOTES:

*Logs Shown are for borings located at Jefferson St. tunnel and Connecticut River dike.*

*Logs for other boring Located on Plate F-1 are included on separate sheets at the end of this appendix.*

| REVISION | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

| DR. BY A.W.D. | TR. BY G.H.D. | CK. BY A.W.D. |
|---|---|---|
| SUBMITTED: CHIEF, ENGINEERING SECTION | | |
| CHIEF, F & M BRANCH | | |
| CHIEF, ENGINEERING DIVISION | | |
| APPROVED: CHIEF, PLANNING BRANCH | | |

CONNECTICUT RIVER FLOOD CONTROL
PARK RIVER CONDUIT EXTENSION
RECORD OF EXPLORATIONS
PARK RIVER, CONNECTICUT
APPROVED: DATE: JULY 1966
CHIEF, ENGINEERING DIVISION

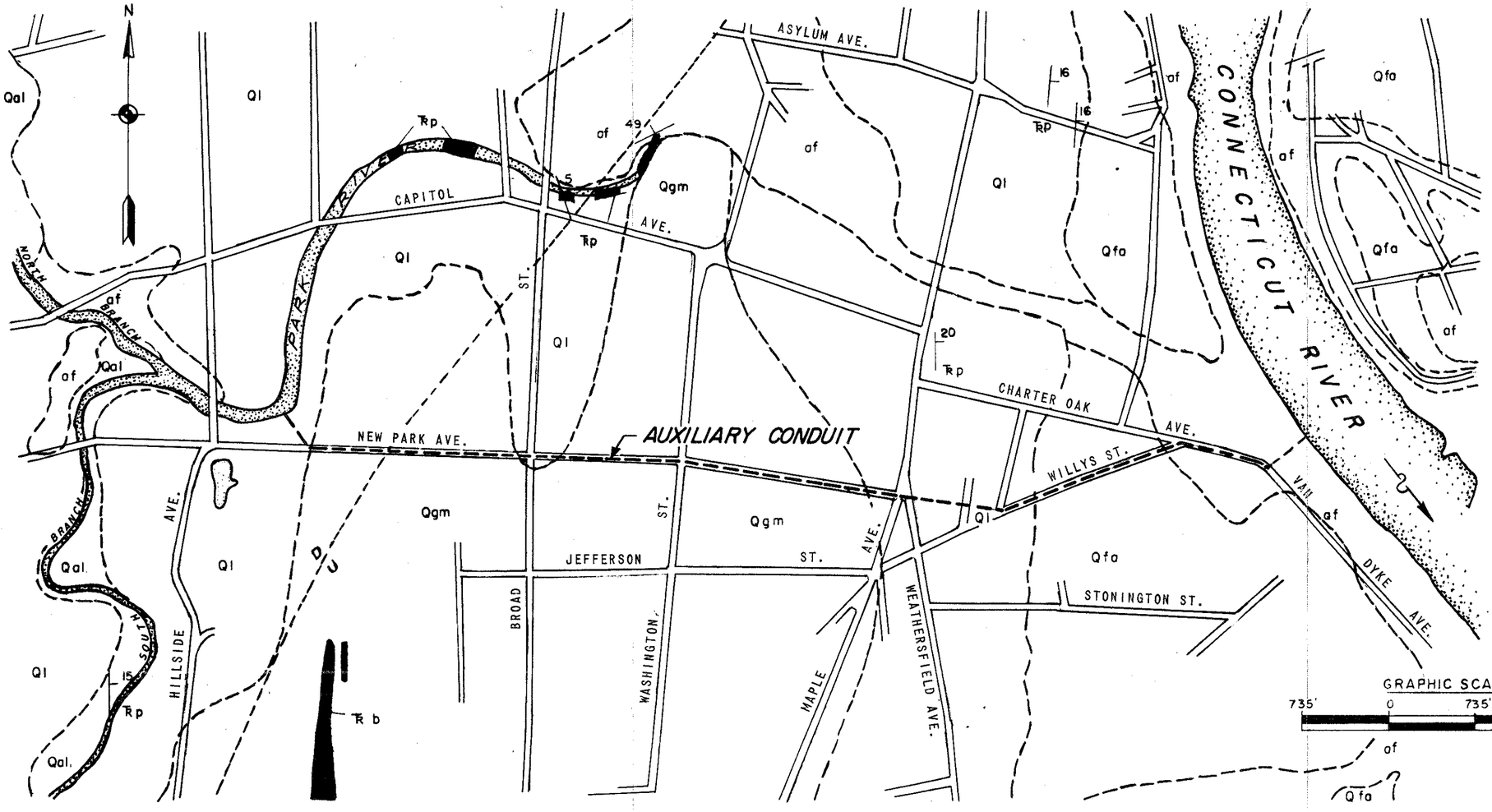
TO ACCOMPANY REPORT DATED 21, JULY 1966

SCALE:
SPEC. NO. CIV. ENG. 19-016-
DRAWING NUMBER
SHEET 3 OF 4

PLATE F-3

CORPS OF ENGINEERS

U.S. ARMY




## LEGEND

| | |
|---|---|
| Qgm | Ground-moraine deposits (Till) |
| Qfa | Flood plain alluvium |
| Qal | Local alluvial deposits |
| Ql | Lake-bottom deposits |
| af | Artificial fill |
| Trp | Portland Arkose |
| Trb | Hampden Basalt |
| 15 | Strike and dip of beds |
| D / U | Fault in bedrock. D = Downthrown, U = Upthrown. |
| | Bedrock outcrop |

**NOTE**

*Source map: "Geology of the Hartford North Quadrangle, Connecticut", dated 1959-60, by R.V. Cushman, U.S.G.S.*

CONNECTICUT RIVER FLOOD CONTROL

# PARK RIVER CONDUIT EXTENSION AND AUXILIARY CONDUIT

## SURFICIAL GEOLOGY

SHEET 4 OF 4

PARK RIVER CONNECTICUT

PLATE F-4

# APPENDIX G

# LETTERS OF COMMENT

# APPENDIX G

## LETTERS OF COMMENT

### INDEX


| Exhibit No. | Agency | Letter dated |
|---|---|---|
| G-1 | Soil Conservation Service, U.S.D.A. | 21 December 1965 |
| G-2 | Department of Health, Education, and Welfare | 27 December 1965 |
| G-3 | Fish and Wildlife Service, U.S.D.I. | 7 December 1964 |
| G-4 | Water Resources Commission | 10 January 1966 |
| G-5 | The Metropolitan District | 18 March 1966 |
| G-6 | The Metropolitan District | 15 December 1964 |
| G-7 | Greater Hartford Flood Commission | 18 April 1966 |

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Old Bookstore Building
Storrs, Connecticut 06268

December 21, 1965

Mr. John Wm. Leslie
Chief, Engineering Division
U. S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Mr. Leslie:

Your proposal for flood control work in the Park River basin in Connecticut has been reviewed and we are in complete agreement that this work should be done.

We have pointed out on numerous occasions that the full benefits of work now under construction on this channel will not be realized until gaps in the conduit are completed. As far back as three years ago and several times since, we have suggested that the Greater Hartford Flood Commission consider the construction of a pilot channel in these gaps in order that the level of water would be lower to help construction now under way. This would benefit the Connecticut Highway Department construction as well as the channel work which is under contract and which is subject to backwater from the unimproved gaps south to New Britain Avenue.

We heartily endorse this proposed improvement.

Sincerely yours,

N. Paul Tedrow
State Conservationist

EXHIBIT G-1

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
REGIONAL OFFICE

PUBLIC HEALTH SERVICE

Region I
120 Boylston Street
Boston, Massachusetts 02116

December 27, 1965

Mr. John Wm. Leslie
Chief, Engineering Division
U. S. Army Engineer Division
New England
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts

Dear Mr. Leslie:

In accordance with your request of 13 December 1965 we would like to provide the following comments on the Park River Flood Control Project.

We recommend that the design and construction of the project contain adequate provisions for the implementation of present and future combined sewer separation plans. In addition, we recommend that facilities be provided for the collection and treatment of wastewater, which may now be discharged to the Park River.

To facilitate these recommendations we suggest close coordination be maintained in the formulation of the project with the Connecticut Water Resources Commission, the Hartford County Metropolitan District, and this office.

Sincerely yours,

for Earl J. Anderson
Acting Regional Program Director
Water Supply and Pollution Control
Public Health Service

EXHIBIT G-2

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE
59 TEMPLE PLACE
BOSTON, MASSACHUSETTS 02111

December 7, 1964

Division Engineer
U. S. Army Engineer Division, New England
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

Reference is made to your November 20, 1964 notice stating that a public hearing on the review of flood control in the Park River Basin, Hartford, Connecticut will be held in the Capitol Building, Hartford, Connecticut on December 15, 1964.

Based on our knowledge of the area and the limited fish and wildlife resources we believe that any modification of the existing project which is within the Hartford city limits will have no significant effect on the resources; neither would there be any appreciable opportunity for improvement.

In view of the above, we do not plan to report on this project.

Sincerely yours,

Thomas A. Schrader

Thomas A. Schrader, Chief
Division of Technical Services

EXHIBIT G-3

# STATE OF CONNECTICUT

*WATER RESOURCES COMMISSION*

STATE OFFICE BUILDING · HARTFORD 15, CONNECTICUT

January 10, 1966

Division Engineer
U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham 54, Massachusetts

Attention: Mr. John Wm. Leslie, Chief
Engineering Division

Gentlemen:

Reference is made to your letter of December 13, 1965 requesting our comments on the plan developed for flood control on the Park River Basin in accordance with the Senate Committee Resolution approved October 16, 1961.

As you know, the Greater Hartford Flood Control Commission exercises the primary interest in flood control in the Park River Basin. Through our associations and connections with that Commission we are aware of their interest in the project which you describe. It is assumed that you have received their views.

We will attempt to keep abreast of the developments of this project so that at various stages we may offer comments if it appears that they are desirable and appropriate.

Very truly yours,

William S. Wise

William S. Wise
Director

WSW:JC:s

EXHIBIT G-4

THE METROPOLITAN DISTRICT

115 BROAD STREET
HARTFORD 5, CONN.
TELEPHONE 525-0841
5-AWS/smk

OFFICE OF THE
DISTRICT MANAGER

March 18, 1966

John William Leslie, Chief,
U. S. Army Engineer Division
Corps of Engineers
424 Trapelo Road
Waltham 54, Massachusetts

SUBJECT: PARK RIVER BASIN, HARTFORD
REFER TO USA ENGS. FILE NE DED-R

Dear Mr. Leslie:

In your letter of March 10, 1966 you asked for our comment for inclusion in your report on proposed improvements for flood control in the Park River Basin, Hartford County, Connecticut, at an estimated Federal first cost of $30,800,000 and an estimated local cost for lands, damages and relocations of $900,000.

Our comment is that we strongly urge and recommend the immediate start and early completion of these improvements. Any delay in making these improvements could conceivably result in serious flooding damage under certain conditions to property in the areas needing flood protection, and interruption to the normal operation of the District's sewerage and drainage system.

We have commented similarly on a general statement transmitted to you by Edward J. McDonough, Chairman of the District Board, under date of December 15, 1964.

We have given more detailed information and suggestions on our drainage and sewerage system involvements, and other comments in letters dated August 10, 1964, December 17, 1964, March 2, 1965, April 2, 1965 and a statement and recommendations submitted by The Metropolitan District Commission on October 1, 1964.

Our Bureau of Public Works (sewerage system functions) and our Water Bureau (water system functions) will be glad to recommend District cooperation in any appropriate way.

Very truly yours,

William A.D. Wurts
District Manager

Enc. 1
cc: GUG
AWS

EXHIBIT G-5

THE METROPOLITAN DISTRICT

115 BROAD STREET
HARTFORD, CONN. 06105
TELEPHONE 525-0841

EDWARD J. MC DONOUGH
CHAIRMAN, THE DISTRICT BOARD

December 15, 1964

Peter J. Hyser, Brigadier General
U.S. Division Engineer
U.S. Army Engineer Division, New England
424 Trapelo Road
Waltham, Massachusetts

SUBJECT: STATEMENT
PUBLIC HEARING ON REVIEW OF FLOOD CONTROL IN
THE PARK RIVER BASIN, HARTFORD, CONNECTICUT

Dear Sir:

The Metropolitan District Commission strongly urges further effort to improve flood protection in the Greater Hartford area. The elimination of flooding in the Park River basin is a vital step in improving the sewerage and drainage system in this part of the District.

The proposed deep flood conduit along Park Street, in Hartford, should be helpful to the District and its inhabitants. This flood conduit should provide a less distant and more economical outlet for some of the storm drains to be built as part of the District's comprehensive plan which the District has already undertaken to separate Hartford's old combined sewers.

The District has always worked with the various local, state and federal flood protection agencies to properly plan flood protection work, especially when the District's sanitary sewerage system is involved; substantial District funds have been expended to plan and build sewerage system improvements brought on, or made possible, by flood protection work to date.

We will look forward to working with you on any further flood protection work you undertake.

Very truly yours,

Edward J. McDonough
Chairman

EXHIBIT G-6

# GREATER HARTFORD FLOOD COMMISSION

11 ASYLUM STREET
HARTFORD, CONNECTICUT 06103

TELEPHONE 522-9808


April 18, 1966


*Commissioners*

VINCENT P. CENCI, M.D.
E. WELLES EDDY
WILLIAM E. GLYNN
HAROLD F. KEITH
JOHN C. PARSONS
H. WARD PINNEY
LYONEL H. PUTNAM

HAROLD F. KEITH
*Chairman*

E. WELLES EDDY
*Vice Chairman*

H. WARD PINNEY
*Secretary*

CHARLES W. COOKE
*Director*

PHILIP C. SMITH
*Chief Engineer*

ALEXANDER A. GOLDFARB
*Counsel*


Colonel Remi O. Renier, Acting Division Engineer
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Colonel Renier:

This is to acknowledge receipt of your letter of March 24, 1966 with its enclosures. My desire to bring this matter to the attention of the entire Commission necessitated the delay in responding to your letter.

We wish to advise you that we have carefully examined the proposed work as outlined in your letter and as indicated on the maps forwarded therewith. Based upon this examination and the numerous staff conferences referred to in your communication, we wish to advise you that the Greater Hartford Flood Commission is satisfied that the proposed works taken together with the conduit and channel work thus far completed by this Commission will be adequate to accomplish substantial flood control protection in that area which is the subject of our mutual concern. We were disappointed to learn that your recommendations will not include the extension of the conduit to a point north of Farmington Avenue, but we are sure that there are good and adequate reasons for this omission.

The Greater Hartford Flood Commission and the undersigned wish to take this opportunity to assure you that it is willing and able to furnish the required measures of local co-operation as outlined in your letter. You may be interested to know that in hopeful anticipation of a favorable report, steps have already been taken and some moneys already appropriated with a view to acquisition of certain of the easements and rights-of-way necessary for the construction and operation of the project. With regard to Items b, c, and d of the third paragraph of your letter, we wish to assure you that this Commission is willing and able to undertake the responsibilities outlined therein.

EXHIBIT G-7

TO: Colonel Remi O. Renier April 18, 1966

We wish to further advise you that numerous conferences between our staff and the City Plan Commission have been held concerning the matter of flood plain zoning. As a result of these conferences, it is expected that provisions with regard to such flood plain zoning will be included in a comprehensive revision of the zoning ordinance about to be presented to the Court of Common Council of the City of Hartford by the City Plan Commission.

On behalf of the people of the City of Hartford and its environs, the City Administration, and this Commission, we would like to take this opportunity to express to you and your staff our sincere appreciation for the interest and concern you have demonstrated in assisting us in accomplishing our goal of providing a maximum in flood control protection.

We shall be anxiously awaiting your full report.

Very truly yours,

Harold F. Keith
Chairman

HFK:m

G-7